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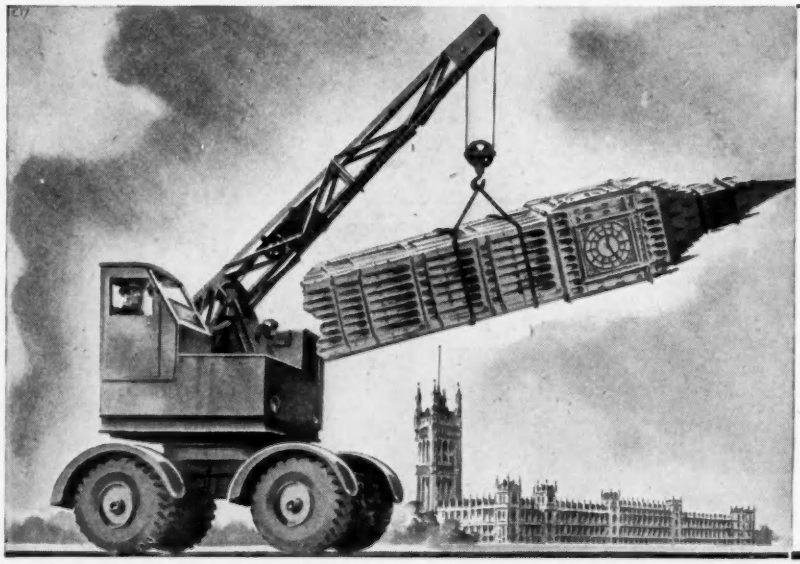

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The Dock and Harbour Authority

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Editorial Comments

New Volume.

The commencement of a new volume is always a noteworthy incident in the life of a journal, since it affords a fitting opportunity for " taking stock " and reviewing the progress made to date. We are now entering upon the xxvith annual volume of the series and moreover the present year will see in November next the issue of the 300th number, marking the 25th anniversary of the foundation of the Journal. The occasion, therefore, is one of some importance.

It would be premature, however, to indulge at the moment in such reflections as are obviously called for by the attainment of a " Silver Jubilee " (using a term which has come into prominence in connection with the corresponding celebration of our distinguished contemporary, the Institute of Transport) but we hope on the appropriate date to make some reference to the past career of the Journal with a survey of what has been accomplished during the quarter-of-a-century since its inception.

Our readers may possibly care to favour us with their views of the service which the Journal has endeavoured to render to the cause of port progress and development. If so, we shall be extremely pleased to hear from them and to give careful consideration to any suggestions they are good enough to make for further improvement in the conduct of the Journal and the extension of its utility to port officials and users.

Meanwhile the xxvith volume makes its appearance under propitious circumstances. The end of the war with Germany is definitely in sight and although political and economic difficulties are by no means over, British and Allied ports are feeling able to make preparations for a renewal of peace-time activities and the restoration of former friendly rivalry in trade.

Grimsby: Great Fishery Port.

Before the war, it was claimed for Grimsby, and we believe with every justification, that it was not only the premier fishery port of the United Kingdom, but also of the World. Whatever dignity or importance attaches to the title, its significance has disappeared, temporarily at any rate, for there has been little opportunity, while mine-fields have abounded and hostile aircraft have ranged overhead, for fishing fleets to carry on their operations unmolested. Though supplies of fish for the inhabitants of this country have certainly not failed, they have necessarily been curtailed with the closure of some of the more prolific and frequented fishing grounds. At any rate, no fishery statistics have been published for some time and the provenance of supplies is at present a matter of conjecture.

The historical survey of the development of the port from ancient times, as set out in the article in this issue by Mr. F. C. Bowen, will be found of undoubted interest, for Grimsby, like its name, has a remote origin—probably Danish. In recent times, it owes a great deal to the enterprise of the London and North-Eastern Railway Company, who have provided it with a capacious dock system, modern quayside equipment and admirable facilities for the handling and despatch of the fish catches. To relieve the pressure on the port, an adjunct has been constructed at Immingham, 5 miles distant, and this deals with the more general trade of the district; timber, iron and steel, coal, etc., leaving Grimsby (although it still has some general trade) free to cope with the development of its fishery business.

When war-time restrictions have been removed, Grimsby may be expected to resume to the full its former activities and live up to its pre-war reputation and even surpass it.

The Basis of Port Rates.

The Discussion, only just released for publication in this Journal, on Dr. Tutin's Paper on Methods of Levying Charges for Services to Shipping, which was published in our issue of October last, did not show any unanimous attitude of approval on the part of the meeting towards the proposed new method of rate computation by linear measurement as opposed to tonnage measurement. Most of the speakers, however, were agreed in condemning the existing system, on the tonnage basis, as illogical and complicated, and further, as leading to the design of ships on unsatisfactory and uneconomical lines. But no wholly acceptable substitute on the linear basis seems to have been evolved and the meeting terminated in the passing of a resolution which shelved a decision on the matter, and left it open, pending the outcome of the deliberations on tonnage measurement laws proceeding at the conference of shipbuilders with the General Council of British Shipping.

Undoubtedly the question is a difficult one in view of the necessity of reconciling so many divergent interests. It was pointed out that consideration was due to the small ship no less than to the large one. The former was called upon to contribute in port

Editorial Comments—continued

charges towards the greater outlay incurred in making provision for the latter, and further it could not be overlooked that coasting and short-distance vessels made many more visits to ports and paid dues more frequently than ocean liners. Expediency and influence on ship design were other factors which had to be borne in mind.

But however difficult the position, it has to be faced and it is to be hoped that a solution satisfactory alike to port authorities and shipowners will shortly be forthcoming.

The Merseyside Plan.

The first thing to be observed about the impressively-sized Report by Mr. Longstreth Thompson on a planning arrangement for the Port of Liverpool and Merseyside (extracts from which are to be found in this issue) is that, while stated to be prepared with " the unstinted help and indispensable collaboration " of members of the Technical Committee of the Merseyside Advisory Joint Planning Committee, that Committee does not appear to include amongst its members any representative of the executive staff of the Mersey Docks and Harbour Board, which is the body statutorily responsible for the maintenance and development of the port. This is the more remarkable in view of the stress laid upon the centrality and importance of the port in the whole structure of the design. It is true that there has also been consultation with the Mersey Dock Access Committee, but this has apparently been limited to consideration of "more space for roadways, railway sidings and warehousing for the better handling of cargoes "—matters excellent in themselves, but insufficient in scope for envisaging the future of the port as a whole. This omission rather detracts from the effective value of the Report in so far as it deals with possible developments in the port area. Indeed, the compiler seems to rest content with a statement of the chairman of the Dock Board made in December, 1943, that " it would be both improvident and unwise to contemplate at this time any large extensions or additions to the dock area," qualified a little by the subsequent admission of the compiler himself that " taking a longer view it would be still more improvident to neglect to make provision in the planning scheme for an extension of the dock system that may quite well become a necessity in the not distant future." Apart from minor local additions to rail and road and warehousing facilities, such provision as is outlined in the Report is confined to the Northern foreshore of Liverpool Bay on a site beyond the Gladstone Docks, which is assigned as a Reserve Port Area. As the land in question is already in the ownership of the Dock Board and is ear-marked for future developments, this does not advance matters very much.

While it is no doubt true that the most obvious area for port expansion is that indicated at the North end of the Liverpool Dock Estate, it must be pointed out that the site, projecting as it does along the frontage of Liverpool Bay beyond the cover provided by the Wirral Peninsula, is extremely exposed and will call for substantial and expensive protective works, and that the difficulties of docking operation in tempestuous weather will be greatly accentuated. Still, there seems to be little choice in the matter. The Southern frontage of the Port, though well sheltered, is beset by the redoubtable Pluckington Bank, which involves much dredging to keep the existing dock entrances clear of obstruction, and by other accumulations of sand and detritus in the bed of the inner estuary. It is certainly unfortunate that greater use cannot be made of the wide expanse of the Mersey beyond Dingle Point, but the bifurcation of the stream into two small and distinct channels, with an unstable central mass of sandbanks combined with the force of the outgoing current, described a number of years ago by a distinguished river engineer as " a raging wild beast," militates against any projects in this direction. There is certainly the possible alternative of the provision of a small dock system on the Cheshire side, on the foreshore of Tranmere Bay between Cammell, Lairds' Shipbuilding Yard and the Bromborough Dock, with excellent access in deep water, but the site is remote from the central activities of Liverpool and isolated from other docks and therefore not attractive from a commercial point of view.

Beyond the remarks quoted above, there is little else in the Report suggestive of port development on either side of the Mersey, Birkenhead being ruled out as having already an adequate port area for its needs and sufficient to allow for any increase of trade on the Cheshire side. In fact, the main theme of the Report would appear to be the allocation of sites for industry, not particularly, or advisedly, connected with port interests, and the establishment of zones for civic, industrial and agricultural development. These are aspects of the matter with which we are not specially qualified to deal and we, therefore, refrain from making any observations thereon, merely remarking that the interpretation in the Report of the term " Merseyside " is extremely comprehensive and embraces areas along Deeside and on the Eastern seaboard of the Irish Sea which we should certainly consider extraneous to the interests of the Port of Liverpool.

Dockers' Earnings.

The latest Report of the Select Committee on National Expenditure, dealing with the earnings of certain dock workers in this country, reveals some astonishing facts, not least that it has been possible for a dock labourer in the course of a single week to amass by way of earnings the sum of £46 17s. 9d. and that the average earnings of a gang of 12 men for the week were £38 16s. 10d. per man. Taking round figures, this means remuneration for unskilled labour at the rate of over £2,000 per annum—a sum equivalent to the salary of an Under Secretary of State or to that of the managing director of a large undertaking.

Of course, we recognise, that the case was exceptional (in the interests of the country, happily so) but it ought not to have occurred, and the committee point out that it was due to the extreme dilatoriness of those in authority in adjusting the rate to the job, the negotiations being delayed over a period of no less than eight months.

Extracts from the Report are reproduced on another page and we leave our readers to digest the implications in regard to the economy of bureaucratic methods of handling labour, and, not less, to compare the princely rewards for dock labour carried on in relative safety with the meagre pittance of a few shillings daily paid to gallant service men who risk their lives and face terrible hardships in the unobtrusive performance of their duty, and who do not go on strike for every petty grievance, as has so frequently been the case at the quayside and is instanced in the Report on the London Dock Strike in this issue.

Railway Dock Ownership.

A prominent Labour member of the Government has recently expressed at a luncheon of the Mansion House Association, his views on railway administration of docks, asserting (according to the report in *Modern Transport*) that railway companies should not be allowed to own ports. " Docks needed a different approach from that of the railway mind." We are not at all biased in the direction of dock administration by railways, our preference on the contrary, considered as an ideal, being for an autonomous form of local control on the lines of those constituted for the ports of London and Liverpool, but we do thing it unfair that the railway companies who own and so capably administer the docks at Southampton, Hull, Cardiff and elsewhere in this country, should be condemned off-hand in this summary fashion. They have done admirable service in the past and during the war, especially, they have rendered inestimable aid to the national effort, for which they deserve a tribute of praise instead of acid criticism.

Theoretically, of course, it is undesirable, as stated in the 1931 Report of the Royal Commission on Transport, that any one form of transport should own docks and harbours to which access is essential by other means of transport, but the Report added that the Commission were not at all certain that it would be to the advantage of the public that the dock systems should be transferred from their present ownership.

According to the Minister quoted above, railway mentality is different from dock mentality. We fail to see any ground for the discrimination, nor, judging from the extravagant and incautious utterances of some labour leaders, do we see why labour mentality should be regarded as qualified to pronounce a sane and balanced judgment on a matter of such technical intricacy. Labour representatives on port authorities have tended to consider the betterment of wage-staff conditions as the sole object of their election or appointment, without regard to the main interests of the port.

A Hundred Years of Grimsby

A Notable Lincolnshire Port

By FRANK C. BOWEN

IT is nearly a hundred years ago since the Manchester, Sheffield and Lincolnshire Railway Company, later the Great Central and now part of the London and North Eastern, secured an Act of Parliament to acquire the Old Dock at Grimsby, then in such a state that it was practically useless, and to construct a completely new dock on plans which had been drawn up by Mr. J. M. Rendel, for some time President of the Institution of Civil Engineers. The plans were ambitious, involving the reclamation of 138 acres from the river and extending three quarters of a mile beyond the old high water mark.

Early History

That Act of Parliament marked the renaissance of an ancient port, which had been allowed to decline, and the beginning of its development into the present very important shipping and fishing centre. Like many other ancient ports the legends of its origin are mythological and contradictory, but there is fair reason to believe that Grimsby, then Grimesbi, was the landing place of the Danes on one of their first invasions at the end of the Eighth Century. In 1201, it became a borough by prescription; its charters were confirmed at various dates. King John granted it an annual fair, later increased to two, and it was of sufficient importance to return two members to Parliament from 1298 to 1833. In the reign of Edward III it was called upon to furnish eleven ships and 170 seamen for the Siege of Calais, but it was already silting up for the largest ships which were formerly accommodated in its natural harbour. A little later in the Fourteenth Century it was noted for its extensive coasting trade, particularly in malt for Scotland, although the King's officers complained that the mariners were more interested in smuggling, particularly getting wool out of the country when its export was prohibited. than in legal trade. At that time, its greatest trade rival was Ravenserodd, on an island on the North side of the Humber which was eventually washed away by the tide.

Period of Depression

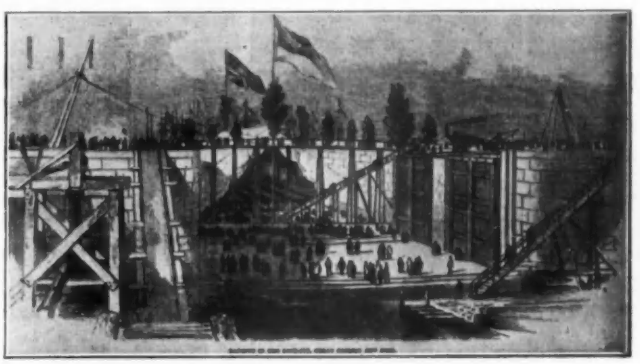
From the beginning of the Seventeenth Century there were constant reports of the silting getting worse and worse, although it appears to have been largely owing to the neglect of the townsfolk. Charles I granted £2,500 for necessary repairs in 1641 and from time to time other grants were made, but no permanent improvement was effected and the trade of the port declined to coasting only, although in that it was the third most important between the Humber and the Thames for the shipment of wool and also had larger imports of Tyne coal than most other ports on the Eastern coast.

Hull eagerly snapped up the trade which Grimsby permitted itself to lose and by the end of the Eighteenth Century the distress in the district was so great, in spite of a general emigration of population, that a party of local men of means incorporated the Grimsby Haven Company by Act of Parliament. The River Freshney was diverted to secure a scour in the natural harbour and what was later known as the Old Dock was opened in 1801, its site at the mouth of Laceby Beck connected with the Humber by a straight outfall. It covered an area of 15 acres, the entrance lock being 150-ft. long by 37-ft. wide with a depth of 18-ft. of water on its cill, at high tide. Altogether £70,000 was spent and it soon attracted a useful Baltic trade, largely because the greatest care was taken to keep its dues well below the level of those at Hull. Attractions were offered to the Greenland whaling fishery, but only one ship responded in 1818, the *Birnie*. which was lost in 1821 and was not replaced. But the North Sea cod fishers using lines found it a very useful base, the water being sufficiently pure to keep the cod alive in free-flooding boxes or smacks which was impossible in Hull. The running expenses of these liners were high and they could only be maintained while cod was regarded as a luxury fish,but as they declined the discovery of the Great Silver Pit to the Southward of the Dogger Bank made an immense difference to the trawlers and was the original foundation of the plans to develop Grimsby.

By that time, the early 'forties, the regular coasting trade had declined to a single service between the Black Lion Wharf, East Smithfield, and Grimsby, maintained by the sailing vessels *Providence, Good Intent* and *Williams*, business was not sufficient to attract one of the steam services which were then running to practically all the coastal ports. In 1844, the Baltic trade was down to one Prussian ship from Stralsend and one Dane from Holbeck, both carrying barley, while nineteen foreign vessels arrived from overseas and eighteen British, six from the colonies and twelve from foreign ports.

Port Works

The work under the new Act was started in 1846* and the enclosure of the area to be reclaimed was completed two years later. It attracted great attention among engineers through the erection of a huge cofferdam, 1,500 feet long, which was placed



Opening of Grimsby Entrance Lock

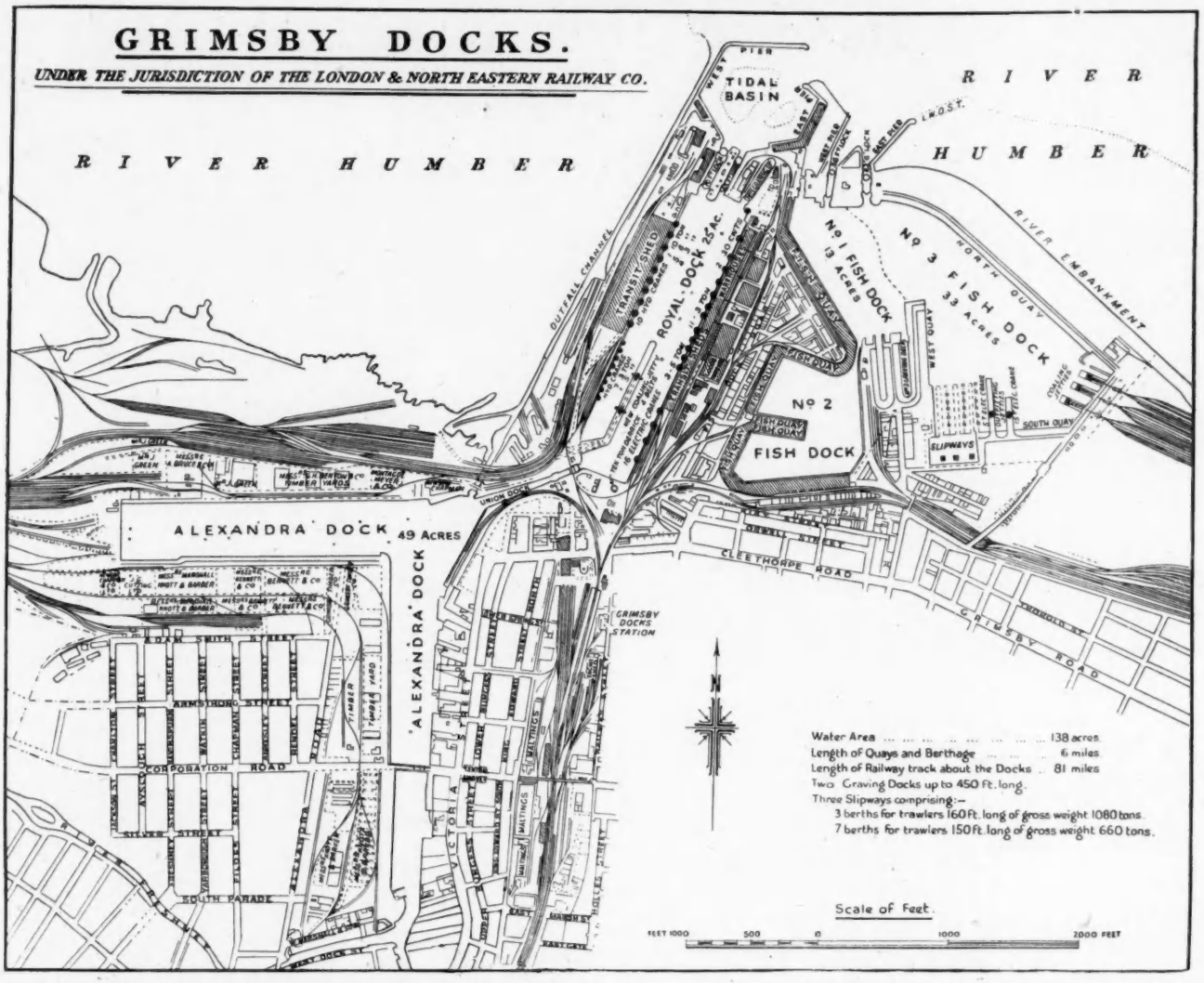
where the average force of the river tide was five miles an hour and the rise and fall 25 feet. It consisted of three parallel rows of whole timber, averaging 60, 47 and 37 feet in length, with a space of 7 feet between the outer and middle rows and 6 feet between the middle and inner. Between the sheet piling the space was filled with clay puddling, the whole work absorbing 709,000 cubic feet of timber. The work included the enclosed dock of 25 acres, a tidal basin of 13 acres with a 260-ft. entrance, extensive timber ponds, a graving dock, etc. The 3,600 feet of quay was fitted with transit sheds, bonded warehouses, granaries, cotton sheds, cattle pens, etc., and had unusually good railway connections for both passengers and goods. Included in the plan was a small 6-acre dock for fishing vessels, for there was already great promise in that trade and Hewett's famous Barking smacks had begun to land their catches at Grimsby in 1848.

The Prince Consort laid the foundation stone on the 18th April, 1849, when it was pointed out that there were no grounds for the fear of Hull interests that their trade would be diverted as there was plenty for both, the dock being completed in March, 1852 and ceremonially opened by Queen Victoria in the following month.†

*In this year the Manchester, Sheffield and Lincolnshire Railway bought out the Grimsby Haven Co.

†The Queen named it the Royal Dock. It covered 25 acres and cost fully £700,000, and was opened for traffic on 27th May, 1852.

A Hundred Years of Grimsby—continued


GRIMSBY DOCKS.
UNDER THE JURISDICTION OF THE LONDON & NORTH EASTERN RAILWAY CO.
RIVER HUMBER
RIVER HUMBER
TIDAL BASIN
PIER
ROYAL DOCK 25 AC.
TRANSIT SHED
OUTFALL CHANNEL
No 1 FISH DOCK 13 ACRES
No 3 FISH DOCK 33 ACRES
NORTH QUAY
RIVER EMBANKMENT
No 2 FISH DOCK
SOUTH QUAY
SLIPWAYS
ALEXANDRA DOCK 49 ACRES
ALEXANDRA DOCK
UNION DOCK
CLEETHORPE ROAD
GRIMSBY DOCKS STATION
GRIMSBY ROAD
ADAM SMITH STREET
ARMSTRONG STREET
CORPORATION ROAD
VICTORIA STREET
SOUTH PARADE
Water Area ... 138 acres
Length of Quays and Berthage ... 6 miles
Length of Railway track about the Docks ... 81 miles
Two Graving Docks up to 450 ft. long.
Three Slipways comprising:—
3 berths for trawlers 160 ft. long of gross weight 1080 tons.
7 berths for trawlers 150 ft. long of gross weight 660 tons.
Scale of Feet.
FEET 1000 500 0 1000 2000 FEET

In 1849, before the docks were opened, the Manchester, Sheffield and Lincolnshire Railway had two little iron paddlers built, *Manchester* and *Sheffield*, to maintain a service to Hull. Between 1855 and 1876 they were replaced by far better ships, *Liverpool*, *Doncaster* and the second *Manchester*, but the railway did not, for the time being, consider any more ambitious service. Instead, as soon as the docks were opened in 1852, it welcomed the North of Europe Steamship Company, which started a passenger and cargo service between Grimsby and Hamburg with the *City of Norwich*. To begin with, a very large part of the outward cargo was fish, but later, coal, bale goods, machinery, etc., came in. In 1856 this service was withdrawn and replaced by the Anglo-French Steamship Company, which interested itself in cargo only.

Development of Fishery Trade

In addition to the railway which owned the docks, the Great Northern and Midland ran services and in 1854 the three of them combined to invite more fishermen to settle at Grimsby with excellent railway facilities. The M.S. and L. Company quoted very small dues and offered to build a special dock : in order to get practical experience the three railways established a company called the Deep Sea Fishing Company and ran nine fishing vessels —four trawlers, two auxiliary steam liners, two full-powered steam liners and one sailing liner. The Hull authorities were indifferent to the fishing business, some members maintaining that it was a hindrance to their overseas trade, so that a few sailing smacks started a migration by transferring from that port and Scarborough. This not only served the railways but sent the export trade in fish up by leaps and bounds. An increasing number of smacks which did not belong to the port made a practice of calling there to land their catch and rail it to London, buying stores and victuals at the same time.

In July 1919 the Forenede Company was the first to restore its service from Grimsby to Esbjerg, but was soon followed by most of the others. As the material became available the schedules were restored to something like their old strength, although by 1932 the Great Central schedule had been cut down to two sailings a week on the Antwerp and Rotterdam runs and three on the Hamburg. The Forenede Company later made its Esbjerg service twice weekly, but when the Malmo service was reopened it ran from Hull instead. On the London service there was a weekly sailing from Wilson's Wharf and the Wynnfield Shipping Company maintained weekly services to Calais, Paris and Rouen. Later the development of road transport diverted a good deal of Grimby's previous trade from the West Riding to Goole and Hull.

The New Fish Dock

In 1928, the pre-war project of the fish dock was revived when the London and North Eastern Railway, into which the Great Central had been merged, as from the beginning of 1923, approached the Grimsby Corporation and the trawler owners and suggested that if the former built the new dock with a public loan the railway would pay a rent equivalent to the annual payment for interest and sinking fund, taking over the work when the whole had been

Grimsby Fish Docks in 1929 before Construction of Extension Works

Entrance to Grimsby Fish Docks

A Hundred Years of Grimsby—continued

repaid. The permissive act was passed in 1929, but the money to be found by the Corporation was limited to £1,250,000 and the balance of the cost, estimated at £1,418,000 in all, was to be provided by the railway. The Government made a grant towards the Corporation's interest on the loan in order to reduce unemployment. Work commenced in November, 1930, the plan having met with very general approval particularly the very fine road

Discharging Catch of Fish at Grimsby

approaches, carried over the railway by a long concrete bridge, and the additional railway sidings. At the same time several improvements in the old docks were carried out although the estimate of the cost was altered by various unforeseen occurrences while the work was in progress.

The No. 3 Fish Dock was opened in October, 1934, having cost between £1,600,000 and £1,700,000. It was built on the foreshore to the East of the existing docks, joined to No. 1, and its 37 acres of additional water area brought the total area of the Fish Docks up to 66 acres. It occupied only part of the area of 175 acres reclaimed behind the new river embankment but it was reckoned that the remainder would be necessary for further industrial improvements, general and coal sidings, etc. It had an entrance lock 204 feet by 45 feet and three pairs of gates. The main quay, parallel to the river embankment, was about 2,000 feet long and on the South side was a 690 feet quay with two fitting-out jetties. Patent Slips were also built for repairs. For many years the Grimsby owners had concentrated principally on the "hotel trade" of the higher-priced North Sea fish, and had built trawlers suitable for that purpose, but they were forced by the long depression to go in for the coarser long distance fishing in the Arctic in 1934, as Hull had done for years. This change of policy, and the opening of the new dock, resulted in an increase in the number of trawlers built.

In 1935 the short sea services from Grimsby, Hull and Goole were rationalised, and to a large extent amalgamated, as the Associated Humber Lines. At first there was a fear that this would result in concentrating the services on Goole and Hull to the detriment of Grimsby, but that proved unfounded. When, two years later, it was proposed to change the Saturday Hamburg sailing to Hull, leaving Grimsby with the less important Tuesday sailing only, protests were made and the decision was reversed, the Tuesday sailing being changed.

In 1935 the railway allocated £100,000 of its Government grant to work at Grimsby and soon afterwards announced a new plan for the extension and reconstruction of the fish market. This involved extending the existing market on the South side of No. 2 Fish Dock, with a new two-storey market, 790 feet long by 92 feet wide and a new reinforced concrete quay. The berthing accommodation for the new type of Arctic trawlers was increased. additional railway sidings and road accommodation was provided and many other improvements included.

At the outbreak of the present war in 1939 the principal imports of Grimsby were timber, wood pulp and dairy produce; the principal exports coal, iron and steel, yarn, fish and fish meal, malt and pig iron. Regular services were mantained by the Associated Humber Lines to Antwerp, Rotterdam and Hamburg, by Worms and Cie, to Dieppe, by the Forenede Company twice a week to Esbjerg. The coastal services to London were maintained by the Free Trade Wharf Company and the General Steam Navigation Company and to Hull by vessels belonging to Messrs. N. Blow and Co., Express Packet Co. and Mr. S. L. Goldthorpe of Grimsby. The standard of the trawlers was also steadily improving, not only in their machinery, accommodation and equipment to obtain by-products but also in their size. The largest owned in the port was the *Gatooma*, 727 tons, but she had been bought from the French and the standard of the new trawlers designed by local owners was rather less than 500 tons.

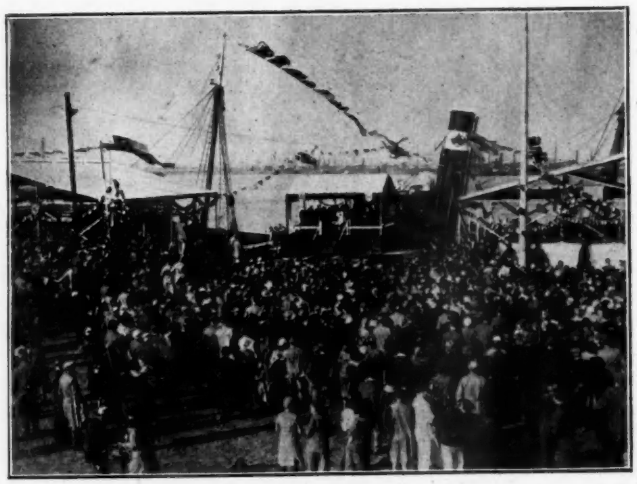
No. 1 Fish Dock was opened in 1856. Two years later, the Dock Company opened its first ice house close by, but in 1859 the trawler owners pointed out that the dock was already getting too small for the trade that it had built up and suggested alterations. A great deal was done to satisfy the demands and the business continued to increase rapidly.

Continental Services

In 1864 the Manchester, Sheffield and Lincolnshire Railway secured parliamentary powers to run steam services to Hamburg, Rotterdam, Antwerp and Flushing, purchasing the Anglo-French Company's fleet for rather less than half their capital and starting running to Hamburg in July, 1865. At the same time, Messrs. John Sutcliffe & Son started to act as their shipping and forwarding agents and, as Sutcliffe (Continental), Ltd., this business is conducted by them to this day. The Hamburg service was joined by one to Rotterdam in 1866, four iron cargo steamers being built to cope with it, and in the following year the Rotterdam service was extended to Antwerp.

Fishery Developments

On the fishing side a further rapid acceleration in the growth of the business started in 1870 and a second fish dock was started alongside No. 1 and was eventually thrown into it*. Two years later the local trade owned 330 first class boats (over 15 tons),



Opening of New Fish Dock, Grimsby

sixteen second class and twenty-five third class, the last-named being those which were not used for lining, trawling or stow-net fishing irrespective of size. The first class boats were divided into 248 trawlers and 82 liners, all sailing, and to Grimsby owners belongs the honour of having changed their rig from the cutter to ketch or dandy, not so fast but far better for towing the trawl.

*No. 2 Fish Dock was opened in 1886 and extended in 1900.

A Hundred Years of Grimsby—*continued*

Some of the fastest of the old cutters were kept with that rig and used principally for carrying the catch of the fleet direct to Billingsgate market, although "fleeting," as that system was called, was not as popular in Grimsby as it was in some other fishing centres.

Dock Extensions

In 1872, also, a move was started to offer additional facilities to the cargo business, the Old Dock being widened and deepened and the new Alexandra Dock being built, having an area of 48 acres and being connected with the Royal Dock by the 1¼-acre Union Dock. This work was completed in 1879 and its results were eminently satisfactory.

Seven years later, in 1886, No. 2 Fish Dock was completed and added to the old, making 23 acres in all and having one side

The hydraulic tower at Grimsby Docks, a famous landmark on the River Humber

occupied by the landing stage and market, 300 feet long, ice and curing houses, railway sidings, etc., all laid out in the most efficient and convenient fashion that was then known. At about that time the Dutch started to land at the port large quantities of cod, ling and haddock, carefully packed in special baskets, which meant more business for the railways. Grimsby's own fleet, not all registered in the port, consisted in 1877 of 445 trawlers, manned by 910 men and 1,340 apprentices, 57 cod liners manned by 280 men and 350 apprentices and 99 cod liners and small craft with 490 men and 100 apprentices working on shares, the total tonnage being estimated at 36,000 and the capital value at half a million pounds. Nobody denied that this remarkable property, on which the prosperity of the area largely depended, had been brought into being entirely by the enterprise in the construction of the docks. Steam trawling started when the Great Grimsby Steam Trawling Company, Ltd., was registered and built two specially designed steam trawlers—most of their predecessors in other centres had been conversions—named *Zodiac* and *Aries* which cost about £3,500 apiece and which were recognised as being the finest trawlers under the British flag.

The railway sailings to Hamburg were increased from two to four a week in 1885, the iron screw steamers *Northenden* and *Warrington* being built in 1886 to cover them, and four years later the railway secured parliamentary powers to run services to Gothenburg, Ghent, Amsterdam, Bremerhaven, Stettin and various ports in the Baltic, Norway, Sweden and Denmark. That was followed by an immediate increase in the fleet, 1891 seeing the construction of the sister ships *Lutterworth* and *Leicester* and *Nottingham* and *Staveley*, of rather more than 1,000 tons each. The increased fleet permitted the Hamburg service, which carried the mails, to be increased to a daily one (except Sunday) as from July 1st, 1891. In the mean time the Danish Forenede Line transferred its Esbjerg service from Hull to Grimsby and further trade was transferred, most of it only temporarily, through the serious Hull dock strike of 1893.

So the prosperity of the port in both its main branches progressed steadily, although there was an unfortunate setback in 1901 when the proposal to change the system of fishermen's pay to profit-sharing with a guaranteed minimum wage led to riots in the docks, the sacking and setting on fire of the offices of the Fishing Owners' Federation and the necessity of calling out troops to assist the police in restoring order and protecting lives and property. The trouble was not finally settled until 1903 and in the mean time the landings of fish were very considerably reduced.

In 1906 the Great Central Railway (the name adopted by the M.S. and L. Railway in 1897) announced that it had abandoned a vast improvement scheme in Grimsby itself and had substituted a linked scheme for creating a new dock system at Immingham, five miles up the river. This was carried into effect, but the company did not immediately transfer its main services. In 1907 a service to the United States was started and in the same year Lord Charles Beresford, visiting Grimsby in command of the Channel Fleet, inaugurated his idea of the Trawler Reserve which proved of such great value during the last war and this. Three years later the value of the fish landed at Grimsby was returned as being almost equal to the combined total of the other five main fishing ports, and it was to take advantage of this that the Great Central Railway promoted a Bill in 1912 for the construction of a new fish dock which was admittedly badly needed. But matters were held up by the war and when it came to be reconsidered in 1919 the cost had gone up from half a million pounds to a million and a quarter; the idea was, therefore, held up.

Steamship Services

At the outbreak of war in 1914, the railway was running a daily service from Grimsby to Hamburg, to Rotterdam on Tuesday, Thursday and Saturday; to Antwerp on Monday, Wednesday and Saturday, and other services were maintained to Esbjerg Monday and Thursday, to Gothenburg on Saturday, to Christiania on alternate Wednesdays and to Malmo on Tuesday. During the war the services with Rotterdam were taken up by Dutch steamers. The Wilson Line made considerable use of the port and George Haller's smart little coasters maintained a service from St. Katherine's Dock in London in competition with the Free Trade Wharf Co.

After the outbreak of war in 1914, Grimsby and Immingham were used by the Admiralty as a base, the Admiral commanding the East Coast establishing his headquarters at Immingham. Only a few of the port's trawlers, generally the worst, were allowed to continue fishing while 433 trawlers and drifters hoisted the White Ensign and 58 were lost.

Thames Barrage Scheme.

In reply to a question in the House of Commons, Mr. P. J. Noel-Baker stated that there was no likelihood of holding an official inquiry (which would necessarily be prolonged and detailed) into the proposal for a barrage across the Thames, during the present war. A lecture on the subject was given before the Royal Society of Arts on February 14th, by Mr. J. H. O. Bunge, the hon. secretary of the scheme.

Notes of the Month

Harbour Projects in the United States.

The United States House of Representatives has passed a post-war rivers and harbours bill authorising projects estimated to cost nearly $500,000,000.

Santo Domingo Port Enlargement.

The Dominican Legislature has approved the expenditure of $2,500,000 on the enlargement of the Port of Ciudad Trujillo, Work is already in hand.

Great Western Railway Docks Staff.

The following changes in the staff at the Great Western Docks at Cardiff have recently taken effect: Mr. W. H. Victory, assistant to the chief docks manager, is now general assistant; Mr. R. Dixon has become assistant to the chief docks manager, London and provinces; Mr. L. G. Taylor and Mr. W. Jeffers are assistants to chief docks manager, Cardiff.

Opening of Sydney Graving Dock.

The new Sydney graving dock was officially opened on March 24th by H.R.H. the Duke of Gloucester, Governor General of Australia and named the Captain Cook Dock by the Duchess. Dimensions of the dock are given as follows: Length, 1,033-ft.; width, 154-ft.; depth over sill, 47-ft. The cost has been stated at 9 million (Australian) pounds.

Port of Cork Developments.

The Cork Harbour Board are promoting a Bill in the Dail to enable them to undertake the reconstruction of the North and South quays at the port at an estimated cost of £410,000, including repairs to existing property and the acquisition of property held by the Cork Corporation. The works are necessary to provide deep water quayage for modern vessels.

Dock Gate Replacements on Avon.

The Bristol City Corporation have approved a recommendation of the Docks Committee that £65,000 should be spent to replace the inner and outer lock gates at Portishead Dock, and £85,000 to replace the inner and outer gates of the entrance lock and the outer gates of the junction lock at the City Docks. An amendment that the recommendation regarding the City Docks be referred back was defeated. Alderman A. W. S. Burgess, chairman of the Docks Committee, stressed that the engineers had said they would not accept responsibility if the gates were not repaired immediately.

Retirement of Harbour Master.

Captain F. W. Frampton, after an extension by the Southampton Harbour Board of his service in spite of his having reached the age limit, has retired from the position of Harbour Master at the port and has been succeeded by Captain A. E. Bartlett, who was appointed his deputy in January, 1944. Captain Frampton had been harbour master since 1932. He has been presented by the Harbour Board staff with an engraved silver cigar and cigarette box, together with an illuminated address. Mr. H. A. Short, the chairman of the Board has made eulogistic reference to his service at Southampton.

More Mobile Canteens for London Docks.

At the Royal Albert Dock recently two additional mobile canteens for dock workers were presented by Mr. N. F. E. Grey, on behalf of the non-British employees of the Buenos Ayres Great Southern, Western and Midland Railways in Argentina to the Port of London Authority, being accepted on their behalf by Lady Ritchie, wife of Sir Douglas Ritchie, the General Manager. Lady Ritchie in thanking Mr. Grey and the subscribers to the Fund, pointed out the wide area included within the zone of the London Docks and the consequent demands on the numbers of mobile canteens available to visit ships within the time period. The proceedings were opened by Mr. J. T. Scoulding, J.P., a member of the Port Authority.

Great Lakes Navigation.

The navigation season on the Great Lakes of North America was officially opened on March 27th, the earliest date on record, the previous earliest date being March 29th, 1942.

Southampton Port Staff Changes.

Mr. H. L. Ferguson, outdoor superintendent of the Southern Railway Company at Southampton and chairman of the Labour Sub-Committee of the Southampton Port Executive Committee has retired and has been succeeded by Mr. P. W. E. Thatcher, M.B.E., wharfinger and secretary to the Port Emergency Committee. Mr. F. G. Walker becomes wharfinger in place of Mr. Thatcher.

Important Port Development Programme at Philadelphia.

Recommendations involving an expenditure of approximately $31,000,000 have been made at Philadelphia, U.S.A., by the Department of Wharves, Docks and Ferries to the City Planning Commission toward a post-war municipal programme covering a six-year period. The projects outlined by the department include the construction of several new municipal piers, improvements to the present group of city wharves and the rehabilitation of the City's dredging plant.

The Late Earl Lloyd George and the Port of London.

In connection with the recent death of Earl Lloyd-George of Dwyfor, it may be recalled that it was during his period of office as President of the Board of Trade in 1905 that the Port of London Authority had its inception. After protracted negotiations with the several dock companies, then in existence, he concluded arrangements for the purchase of the various undertakings and introduced the Bill for the creation of the Port Authority. The Port of London Act, 1908, was finally piloted through the House of Commons by the present Prime Minister. Fourteen years later, in 1922, Mr. Lloyd-George, then Prime Minister, officially opened the new Head Office of the Authority in Trinity Square.

Mobile Kitchen for Liverpool Docks.

Mr. A. E. Bryan, the Canadian Government Trade Commissioner in Liverpool, has presented to Mr. Robert L. Holt, chairman of the Docks and Quays Committee of the Mersey Docks and Harbour Board a fully-equipped mobile trailer kitchen for the use of dockers.

Mr. Bryan said that the kitchen came from the War Efforts Committee of the Wellington County Council, Canada, through the medium of the Guelph *Daily Mercury* air raid distress fund. Guelph was a town of only 24,000 people, yet citizens of Guelph and Wellington County had donated 60 mobile canteens to their friends in Great Britain, and their contribution for this purpose alone now amounted to over 15s. a head of the population. Expressing thanks for the gift Mr. Holt said it would be of great service to the dock estate. He was amazed at the extreme generosity of the people of the little town of Guelph.

New Regional Port Director for North-West England.

Lord Leathers, Minister of War Transport, has appointed Mr. R. P. Biddle, C.B.E., to be Regional Port Director for the North-Western Area in succession to Mr. R. Letch, who has resigned owing to ill-health. Mr. Biddle is Deputy-Director of Ports at the Ministry of War Transport, for which appointment his services were lent to the Government by the Southern Railway early in 1941. Before that, he was the Docks and Marine Manager of the Southern Railway in charge of Southampton Docks and steamers operating from the Channel ports. In September last Mr. Biddle was appointed a C.B.E. for his services in connection with the planning for the landing in Normandy.

Mr. Letch is Assistant General Manager, Port of London Authority. His services were lent to the Government in January, 1941, since which date he has acted successively as Regional Port Director for Scotland and for the North-Western Area of England.

*Methods of Levying Charges for Services to Shipping**

*Discussion by the Institution of Naval Architects**

Mr. A. Murray Stephen, M.C., B.A.: May I say that I welcome this paper, as it affords a timely opportunity for the discussion of the present position and effects of the tonnage regulations. Moreover, I would thank the author for the way in which the paper is put and the trend of thought which it shows. But, before discussing the paper in detail, it would not be out of place to make some general remarks on the subject of tonnage measurement. During the past year, there has been a good deal of discussion in the Press on the subject, and while some defence of the *status quo* has been made by a few commentators, this defence of the present tonnage regulations has in no case been based on the merits of the regulations, but in almost every instance, on the expediency of retaining them, or at least retaining them for a time. If these criticisms are examined, it would appear that in some cases at least, the full effect which the present regulations already have and are likely to have in the future on the design of ships, has not been realised. This is not altogether surprising as so complicated have the rules become that considerable time and mental effort are needed by anyone who wishes to understand their working; in fact, a knowledge of the implications of these rules and of the tricks of the trade necessary to deal with them has almost become a vested interest.

That the rules have a harmful effect on ship design and are likely in the future to have an even more harmful effect on the progress and development both of ships and engines, is realised by most designers, and the shipbuilding industry has felt it its duty to the nation to warn the Government that the ships which the shipbuilders are bound to produce under the present Laws are not as good ships as they should be.

Would it not be to the credit of the Institution of Naval Architects if they were to throw the weight of their great influence behind this warning by the shipbuilders, by a resolution endorsing it?

If ever there were a clear case where technical progress is being hampered by the dead hand of the great mass of non-technical people, this, surely, is a test case. Too little scope is given in this country to the technical man in general, and his opinion is overridden far too often by non-technical minds, which have in one way or another the power to do so.

The present tonnage rules have been evolved in this country and have been accepted throughout the world during the period when this country was undoubtedly the leader in all maritime developments. Temporarily, at least, we have lost that lead. If we do not recover it, it may be said in the future that one of the monuments left by British shipping when it was the acknowledged leader, was the present tonnage laws, and the natural commentary of that would be, that any nation who could leave such a ridiculous monument richly deserves to lose any leadership which it had once held. Even if we do recover our leadership, it is unlikely that we shall ever again be in the same unchallenged position in which we were fifty years ago. The present time would seem to be our last chance as a nation to blot out this monument of inefficiency which we have set up for the whole world to follow.

Other nations who move more quickly in technical matters than we do as a nation, and who seem to pay more honour and attention to their technical men, will undoubtedly demand that these illogical and complicated rules, which, if they can be said to relate to any principle at all, relate to the wrong principle, should be swept away. They will demand that logical simple rules shall be evolved, based on the right principle—that is to say, on services rendered—and shall be substituted for the present rules. Now, there are several formulæ which would fulfil this latter requirement, and that by the author is one of them. His formula is very much akin to that which I ventured to suggest as the best one, a year ago. Broadly speaking, he would add the ingredients of his formula together, whereas I had suggested multiplying them. There is not a vast difference in principle, but only in the results. Two others which have been advocated are one based on displacement and one on L × B × depth with an allowance for houses. Some of the author's arguments for the additive formula are logical, but there is one aspect which should be made clear and that is that the additive formula will inevitably ease the burden on the large ship very substantially and increase it on the small ship correspondingly, unless the dues per ton are graded according to the size of ship. Moreover, I doubt if he is right in using an additive formula to cover the cost of the provision of port facilities. The cost of certain facilities such as dry docks and basins quite clearly vary as the multiple of the length, breadth and depth, and these must form a substantial part of the cost of most ports. The author suggests making the draft in his formula the actual draft or the mean of actual drafts. Would it not be simpler to use the assigned draft throughout? Then each ship has only one tonnage which is calculated once and for all, and has not to be recalculated on each occasion after checking the draft marks.

Sir Maurice Denny, Bt., C.B.E., S.B.: I find it difficult to speak dispassionately on this topic. For long in my own business I have avoided anything to do with tonnage, because it arouses emotions which are better avoided by the wise man.

The author has done a real service in advancing the discussion of this subject, which is once more prominently in the minds of shipbuilders. Whether or not one agrees with his proposals, his comment is timely on a curious feature of the present system, and that is the doubt whether charges are based on services rendered or on capacity to pay. The author suggested that he knew of no other instance—perhaps he meant no other industry. I can only think of one, and that is the medical profession. Even if this fundamental vagueness were cleared up, a very great deal would remain to criticise, but the ground for constructive thought and suggestion would be better prepared. Personally, I doubt whether the difficulties in the way of drastic provision would be eased by the advent of a new label. The word tonnage, we all must admit, is deeply embedded in the minds of all concerned, nationally and internationally, and even realising fully how confusing the word can be because of the almost innumerable meanings which can be and are attached to it, I feel that, psychologically, to press for its abolition would probably raise more difficulties than would be dissipated. It seems to me also, and for the same reason, that whatever might be the new method, it would be convenient if tonnage figures produced by it were not, on the average, wildly different from present figures, and in saying that I assure you I do appreciate that I am sacrificing logic to expediency. We must recognise, I think, that shipowners are even more vitally concerned in modifications of tonnage than are shipbuilders. Unless both parties press jointly for a review, the outlook does not seem to me promising. I have heard owners argue that as a certain gross total of revenue must be ingathered by dock and harbour authorities, all that a change in rateable value could effect would be a change in the incidence of payments as between one ship and another. Now, we must admit that that is perfectly true, but I submit that it is a short-sighted criticism. Dr. Tutin has referred and very properly, to the overwhelming influence that might be brought to bear by the two great canal authorities in the world, but I submit that so long as these authorities feel that they are reasonably certain of the proper income which they require to cover their liabilities then they might also be persuaded that it was just as well to work on a simple and quasi-logical basis than on an extremely complicated and ridiculous one. The present tonnage laws and their interpretations are highly unsatisfactory. Indeed, they are often ridiculous, as we all know. It is unnecessary for me or anybody else to give examples to support this statement in view of the excellent address given by Mr. Stephen last year.* Notwithstanding the general recognition of this fact, however, unless it can be shown to shipowners that they will gain by the change, the chance of effective action does not seem to me very rosy. If the reaction of each individual shipowner to proposals is only to consider them immediately from a narrow and perhaps a selfish point of view, that is whether he would or would not gain, then contacts are necessary as between the two industries in order to explain to the shipowning industry why this narrow criterion is inadequate. A useful suggestion may be that new rules should apply only to

* Reproduced by permission from the Journal of the Institution. The Paper on this subject by Dr. John Tutin appeared in the issue of this Journal for October, 1944.

* Trans. Institution of Engineers & Shipbuilders in Scotland, Vol. 87.

Methods of Levying Charges for Services to Shipping—continued

new ships. Universal application would then be deferred for a matter of twenty or twenty-five years, but I suggest that would be a very small price to pay for the advantages which might be secured. It should by now be abundantly plain, I think, that what is needed and what is sought is not merely modification or revision or tinkering with the present rules, but a drastic revision to sweep away for ever the hampering and arbitrary jungle which prevents progress and is so exasperating. Tonnage laws should not penalise a vessel in which the machinery space in volume is adequate for its purpose to-day but inadequate to comply with requirements deemed proper in the early days of steam propulsion. Tonnage laws should not require that a vessel with continuous super-structures should be less seaworthy than it might otherwise be in order that the dues should be reduced, and yet that is exactly what the present tonnage laws do. Government Departments will assert that nothing can be done without elaborate international enquiries and consultation, and that claim has an ominous ring about it. Whatever may have been necessary in the past, do not the circumstances of to-day present a unique opportunity for at least one example of rapid international co-operation? Like Mr. Stephen, I am not so much concerned now with the merits or the demerits of any particular formula. If a sufficient identity of view can be established between the shipowners and the shipbuilders of the major Allied maritime powers, then the rest, I suggest, is a matter for discussion as quickly as may be, of reasonable compromise in the determination to reach a good conclusion.

Mr. Wilfrid Ayre: The proposal which the author makes with the object of assessing dues on a more equitable basis than that prescribed by the present system of tonnage measurement, in my view, would not cure the present ills. Assessment on the dimensional basis which he advocates would probably result in the small ship paying much more, and the big ship less, dues than at present. A small ship, say, of the coaster class, might incur an additional handicap because it makes use of ports and harbours much more frequently than a big ship. To seek agreement on any alternative basis for the assessment of dues many parties would require to be consulted—shipowners, port and harbour authorities, and the Governments of many countries. If on any alternative basis one section of shipowners was to get an advantage at the expense of another I doubt if it would be an easy task to get agreement by the shipping industry. Many are agreed that the present methods of calculating tonnage are out of date and indefensible; they are a barrier to the attainment of good design. But if we are to seek a change then agreement by all parties should not be made too difficult.

There are two matters concerned with the present system of tonnage measurement that deserve urgent consideration. I refer to (a) deduction from gross tonnage for propelling power space, and (b) permanent erections in vessels of shelter deck and poop, bridge and forecastle type. The requirements that engine rooms must be a minimum of 13 per cent. of the gross tonnage in order to obtain a 32 per cent. deduction is often a handicap to attaining the best ship design. No reputable ship designer would deliberately seek to make an engine room smaller than the reasonable requirements for accommodating the propelling machinery. To comply with the 13 per cent. requirement engine rooms often require to be made much larger than what is properly required. I would suggest, therefore, that the present allowance of 32 per cent. of gross tonnage for propelling power space be admitted as a right without the requirement that the tonnage must be 13 per cent. of the gross tonnage. If this proposal was agreed to, the tonnages of existing ships would not be effected to any appreciable extent.

With regard to the question of permanent erections in vessels, such as shelter deck and poop, bridge and forecastle type which have proved to be useful types of bulk carriers, when these exempted spaces are used for carrying cargo, dues are paid, but in order to secure exemption from measurement " tonnage openings " comprising deck openings, doors in erection bulkheads, wash ports or scuppers, not having permanent means of closing them, must be fitted Temporary closing appliances are permitted but these are required to be of non-weathertight design. These prevent the attaining of the highest standard of seaworthiness. The present law requires, in effect, that exempted erections must be so designed as to make them vulnerable to the perils of the sea. This is tantamount to decreeing that the more safeguards that are provided to enhance the seaworthiness of ships the greater is the penalty incurred in respect of tonnage. It is reasonable to argue in the interest of safety of life at sea, that the reverse should be encouraged. I would suggest, therefore, that all permanent erections or enclosed spaces situated above the " freeboard deck "—such as are associated with vessels of " open " shelter deck, or poop, bridge and forecastle type—when these are not fitted with accommodation or do not carry cargo or other merchandise, should be exempted from tonnage measurement and abolish the requirements of fitting tonnage openings, doors, wash ports and scuppers as a condition of exemption. Here again, if this proposal was agreed to, the tonnages of existing ships of these types would not be effected but their seaworthiness would undoubtedly be substantially enhanced.

The author's proposal is interesting. Any alternative to the present system could, however, only be acceptable if based on common sense and logic.

Mr. E. W. Blocksidge: The present system of British tonnage measurement has been in operation, with periodical amendments, since the introduction of the first Merchant Shipping Act, 1854, ninety years ago. The principle of net register tonnage is based on the volume of freight-earning spaces divided by the number 100, a figure which was adopted for the purpose of maintaining the least amount of interference with statistical tonnage and to provide a basis for dock revenues. Such a basis represents the owner's ability, or the ship's capacity, to pay. In an explanatory article issued before the regulations became law, Mr. George Moorsom, the sponsor of the new method of measurement and Secretary of the Tonnage Commission, stated that the proposals " should produce results expressive, not of the *real* burthen which a vessel is enabled to carry, but a true and just *relative* tonnage between ship and ship, for the purposes of a just assessment of the various dues, and provide a more perfect mode, to work fairly and satisfactorily to the general interests of the commercial shipping of the United Kingdom." The effect of the changes made from time to time on the original idea of preserving the relative value of net register tonnage was shown in diagrammatic form in my paper read before the members of the Institution of Naval Architects in 1925, and indicated the defeat of the original intention of those responsible for framing the regulations. The measurement of ships is a tedious and an unnecessarily complicated procedure, involving the necessity of maintaining a trained technical staff of Government officials. The present regulations are so conflicting and obscure that their application is understood only by the expert. During the past twenty years when changes have been made in the design of merchant ships to suit modern requirements, certain features of their construction have been distorted to meet the inflexible rules of the tonnage regulations. The principal sections of the Act which have produced so much discussion and detriment to progress in design are those which relate to the pernicious system of exempted spaces, the basis of the propelling power allowance, the position of the floors of a ship and the extent of water ballast spaces.

National tonnage regulations are the concern of the Government for the purpose of the registration of ships and providing a basis for Government dues. The British regulations have been adopted by all the maritime countries of the world. The final text of the International Regulations for Tonnage Measurements of Ships was issued at Geneva on June 30th, 1939, and, but for the present war, these rules would now be in operation. The principle of measurement remains unchanged and the rules continue the retrogressive effect on the design and construction of merchant ships. Simplicity is as far away as ever. If any change is now desired, it will mean scrapping the work of this International Committee of Government experts, and would effect seriously the vessels of some shipowners who have specialised in the adoption of the popular shelter-deck type of ship. No Government will take action to revise their rules unless they have a unanimous mandate from the shipbuilding, shipping and dock authorities that a revision is necessary and imperative. Apart from the resolutions passed at the Shipbuilding Conference in February last for urgent discussion with the United States of America as a necessary pre-requisite to post-war ship-

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building progress, such an expression of opinion has not been given by any responsible body representing the interests of British shipping. Technical Societies have discussed proposals for the amendment of regulations, but there the matter has ended and no action taken to bring them to the notice of the Government Authority. When discussing the subject of this paper we must be perfectly clear in our conception of the need for the amendment of tonnage rules. These are framed by the Government for their purpose of ship registration and the payment of light dues, etc. The Dock and Harbour Authorities, as a matter of convenience, adopt the national net or gross tonnage appearing on the Certificate of Registry as the basis of payment of dues for "services rendered," and it is open for them at any time to amend their procedure without Government interference. Dr. Tutin, in the present paper under discussion, and Mr. Murray Stephen in the Presidential Address to the members of the Institution of Engineers and Shipbuilders in Scotland last year, advocate a simple method of assessing register tonnage by means of linear dimensions, introducing length, breadth and draught, but avoiding the inclusion of moulded-depth, and controlled by a co-efficient. Linear dimensions were the basis for tonnage measurement a hundred years ago, and due mainly to the influence of moulded depth were responsible for the production of many unseaworthy ships. In the absence of comparative results with varied types of ships as a result of the adoption of his formula with linear dimensions and a controlled factor, the author leave us completely in the dark. His "Rateable Length" R is well-conceived but open to much criticism, and cannot be considered without detailed investigation. It is not clear in the paper whether the co-efficients governing L, B and *d* would be "weighted" individually to suit the peculiarities in design of each particular ship, or whether one set of co-efficients would be fixed for different ships of the passenger, intermediate, cargo and towing types. There still remains the opportunity for builders or naval architects to adjust the dimensions to suit the minimum value of R desired by the owner, and thus restrict freedom in design. The inclusion of draught *d* in the formula will create apprehension because the load draught varies with the seasons and zones and is not always related to dimensions, as the great majority of cargo ships are assigned minimum freeboards with maximum draught, while the draught of the pure passenger ship is limited and controlled by the strength of her scantlings and/or her standard of bulkhead sub-division. There is another important point to keep in mind when contemplating an amendment of the rules, and that is its influence on "statistics." A formula based on linear dimensions cannot give a true indication of the size or capacity of a ship. I am inclined to favour a system of tonnage computation based on the internal capacities of all freight-earning spaces, without the necessity of actual measurement of the ship. The inquitous rule of "exempted spaces" should be abolished. If the character of freight-earning spaces could be defined, there would be no necessity for "deductions," and the measurement would indicate one register tonnage as representative of the owner's "ability to pay." For the purpose of dock and harbour dues, this register tonnage could be used, if considered necessary, in association with an agreed factor, depending on the type of ship, space occupied, and draught at time of docking; the final figure representing the index for "services rendered." All or any of the proposals suggested must be investigated carefully by a competent body of experts representing the interests of shipping, shipbuilding, underwriting and dock and harbour authorities, together with Government experts, which can be done quickly if we put our heart into the job. It is suggested that this mode of procedure will be the only one which will produce a body of sufficient importance to bring about a radical alteration in the complicated system of tonnage measurement for acceptance by all maritime countries and canal authorities. The need for a radical amendment of the tonnage rules is imperative. The process of making alterations will be difficult in view of the diversity of opinion, but the time has arrived to face the opposition if the interests of shipping are to be considered.

Mr. Sterry B. Freeman, C.B.E., M.Eng.: This subject is one on which, in the first place, we shall have to persuade the shipowners that they are getting a fair deal as between one shipowner and another. That will be matter for the technical societies to do. In the next place, the shipowners want a really seaworthy ship, and many of these tonnage regulations do not conduce to that end. On some occasions, although applying the present rules, we do not get that. In addition, we shall have to find some means to apply standards of assessment, as is done for houses, where the assessing authority comes and says how much is to be paid on certain constructions. That is perfectly true, and the book on Panama Canal tonnage regulations which the author has exhibited shows how not to do it. The main point concerning machinery spaces that strike me as an engineer is this. We are coming on to new types of machinery, such as the gas turbine. I read the other day in one of our leading journals on the steam turbine and the heavy oil engine, in an article regarding marine engine power and consumption, that as a result of infinite ingenuity, comprehensive scientific attack, almost unbelievable complication and crowding of the engine-room, a truly insignificant improvement in the type of machinery has been achieved.

Mr. E. V. Telfer, D.Sc., Ph.D.: I should like to follow up the suggestion made by Mr. Murray Stephen that this Institution should throw its whole weight with the Shipbuilding Conference in a demand for the revision of the tonnage laws. I would therefore like to propose that the Council of this Institution be requested to form a Tonnage Committee so that its findings could be urged upon the Government.

Added after Meeting.

In this connection it is of interest to note that at the end of Mr. Moorsom's 1860 paper, to which the author refers, the then Secretary of the Institution announced that "Mr. Moorsom has intimated to me that he should be glad if the Council of this Institution would favour the Government officers with their views upon this subject and would state what they consider the best mode of making the requisite allowance for steamers." Surely, such an old connection should not be allowed to lapse !

Mr. J.M. McNeill, M.C., LL.D : The principal feature of this paper is the proposal to introduce a new measurement for vessels called "rateable length." To test the application of such a factor, rateable length values have been plotted on a basis of true length for about thirty representative cases taken from *Lloyd's Register* and ranging from vessels 300-ft. long to vessels of the largest size. Corresponding values of gross tonnage have also been plotted. As was to be expected, it was found that whereas the gross tonnage increases at a rate rather in excess of the cube of the length (due, no doubt, to the incidence of passenger spaces and erections) the rateable length normally increases more slowly than directly as the length. From the average curves a 600-ft. vessel has 4.6 times the gross tonnage of a 400-ft. vessel, but the rateable length is only 1.45 times that of the small vessel. Port Authorities would, therefore, not only require to alter the basis of their charges, but some substantial variation in the scaling of the charges would be necessary if a completely altered incidence of the charges between various sizes of ships were to be avoided. The values derived indicate such violent changes that the chances of their acceptance by the Port Authorities are small. The factors neglected in the composition of the assessment are so marked that the prospect of revision of measurement by Government Authorities will be prejudiced rather than assisted by such a scant and illogical treatment of such an important question. While it is agreed that strong support should be given to the Shipbuilding Conference resolutions for revision of existing laws, it is submitted that the first step should be to remove anomalies in measurement of gross tonnage, while retaining this method as a basis for charges and using the same standard units. The anomaly of the shelter deck vessel is probably the most notable one that should be rectified without delay, and this could be done very easily, while, at the same time, effecting a great improvement in the safety of the vessel, without penalizing the owner in any way. There is also the case of the exemption that is granted to the passenger spaces of certain American vessels in between deck spaces above a certain deck. This might be extended to apply to our own passenger vessels to ensure equality of treatment. The questions of machinery space allowance can also be revised so as to remove the present handi-

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caps to progressive design, but, in my opinion, some safeguards guaranteeing the adequacy of the space allotted to the machinery must remain. It is submitted that the methods already proposed for dealing with these questions in conference are the most likely to achieve the best results, but the issues should not be complicated by hastily conceived formulae seeking to upset satisfactory and well-tried units of measurement.

Mr. J. Douglas Calder : There seems to be a general measure of agreement that any system of assessment of ships should be based on the services rendered. I regret that one speaker introduced the item " freight-earning capacity." Once you bring in the question of capacity to pay, you introduce something which is going to upset any system, whether it is measurement of tonnage or rateable length. I am afraid I am like the majority of the speakers. I cannot agree with this formula proposed by the author. It seems to me that any system of assessment must bear in mind two things : first of all, the length of quay space occupied, and, secondly, the amount of water space occupied. If the rateable length formula is going to give equitable results, accept it ; but is it ? I am going to quote two concrete cases. I will submit figures of others in a written contribution. I am taking the upper and lower limits of the British Mercantile Marine, the *Queen Mary*, on the one hand, and a very ordinary Clyde puffer, on the other. For the benefit of visitors from the south, a puffer is a small coaster 67-ft. B.P. built to the limits of the Forth and Clyde Canal. The rateable length of the *Queen Mary* works out at 678. The rateable length of the puffer works out at 104. On this basis, the *Queen Mary* would pay 7½ times as much as the puffer. If you assume the same length of quay space, and assume the *Queen Mary* is alongside the quay and she moves out and the space is occupied by an equivalent length in puffers, the harbour authority is going to collect twice as much from the puffer owners as it collected from the *Oueen Mary*. The author may suggest that is a *reductio ad absurdum*. Just to meet that objection, I will quote the case of two steamers owned by the same company and using regularly the same port. There is a passenger vessel of 13,500 tons gross whose rateable length works out at 457, and there is a little cargo boat which works out at 256. On the present basis, the first vessel pays ten times the tonnage dues of the cargo boat. On the proposed basis, she would pay 1.783 times. Unless I have misread the formula, I think those results are quite sufficient to condemn it. They are certainly not equitable. Unfortunately, I had not the opportunity of studying the presidential address. It seems to me that some such formula would come nearer to meeting the case than anything else that has been put forward. It is length multiplied by beam multiplied by draught and divided by a coefficient. It has at least four merits. It eliminates the vicious effect of the present tonnage regulations in its rate tonnage by the above-water parts of the ship. The above-water parts of the ship, in my opinion, make very little demand on harbour facilities, because the builders of the harbours, after all, did not provide the atmosphere. It is fair between ship and ship, and it is simple, and I am going to suggest a value for the coefficient. There is an old saying about certain people rushing in where angels fear to tread. Not being connected with any Harbour Authority or with any firm building " commercial " vessels, I can look on the subject with impartiality. I am going to suggest a plain simple coefficient of 100. I am not going to weary you with any figures, but just to go back to the three vessels I have quoted, under the present regulations the *Queen Mary* pays 43 times and the passenger ship pays 10 times the amount paid by the little cargo boat. On the formula I have suggested, the *Queen Mary* would pay 26 times that of the cargo boat and the passenger ship about 5½ times. The figures and the result from that formula are such that present schedules could be applied to them by means merely of a decimal or percentage variation. So much for criticism. I think possibly the most important part of this paper is at the end, where the most telling point is made that naval architects should agree and we have been told we should do something. I woul, incidentally, second the author's proposal. I would ask him to accept a slight modification. Why should not the two Institutions represented here to-day, together with the North East Coast Institution, as a preliminary, form a small committee to investigate and report on the problem ? There is a wealth of technical information available, and there is a wealth of individuals who could give the time, and the bulk of the work could be done by committees meeting locally, saving time and travelling. With an agreed basis to start on, the Shipping Federation and the Dock Authorities could be approached and a step taken nearer the realization of our hopes. Allow me to add my thanks to the author for what is certainly a most timely, and, what is even more certain, a most thought-provoking paper.

Mr. H. A. M. Napier, B.Sc. : This is a most appropriate sequel to the Presidential Address to the Institution of Engineers and Shipbuilders last November, and sets out in concise outline the questions which have to be faced.

There seem to be doubts as to whether dues are levied for services rendered to the ship or to her contents, and the extent to which the Port Authority is acting on its own behalf or on behalf of the Inland Revenue.

Various formulae and coefficients have been suggested, but they all tend towards being a function of length, breadth and draft—i.e. a function of displacement. Surely, therefore, displacement would form the simplest and best basis, and would cause the minimum of disturbance as between ship and ship on the present methods of measurement. This would also avoid the inequitable incidence of the present Tonnage Laws.

Mr. Murray Stephen, in his Presidential Address, pointed out many anomalies. For instance, owing to the tonnage laws being about ninety years out of date, they favour oil burning to the tune of about 15 per cent. compared to coal burning, and it is certainly not the business of tonnage measurements to favour one type of propulsion as against another. The welfare side of ships—officers', engineers' and crews' accommodation—has changed enormously in ninety years, and this also has its effect on measurement.

The use of displacement as the basis would avoid any tendency towards the production of extraordinary shapes of ships in an attempt to circumvent the tonnage laws. In fact, the only scope would be to design a lighter ship, compatible with strength and stability, and this would be all to the good.

The incidence of the horse-power tax on the British motor car industry completely cramped that industry, and any similar charge based on one of other dimension of a ship would have a similarly cramping effect on naval achitecture.

It is interesting to note that Admiral Land, one of the leading authorities in the United States, has given great backing to this whole subject of revision of tonnage laws.

The suggestion that a small committeee of the appropriate technical institutions should examine the question is well worth consideration, and they might get in touch with a similar body in the United States, to prepare the ground from the technical aspect.

I would like to thank the author for bringing forward this subject, which has obviously got to be thoroughly examined by all concerned, and the sooner the better, with post-war development in the offing.

The President : Dr. Tutin's paper raises a question of very great importance ,and follows very well on the stone which I understand my fellow-President threw into the stagnant tonnage pool not long ago on this question of tonnage regulations. As it has been put to me, the ripples which were caused in the pool by the statement have not shown any sign of obeying the natural laws of dissipating. It is, of course, an international question, and international questions of that nature have to be dealt with by the Government in the main, and the Government will not act unless they have a pretty big push from those who are concerned in the problem. Government officials seldom understand expert matters. If, then, we are going to get a technical matter through the Government it has got to be done in plain language, and it must also be done with unanimity or as near unanimity as possible. Can we get that unanimity between the shipowners, shall we say ? Mr. Wilfred Ayre has pointed out there are difficulties. I personally feel sympathy with those who say, let us have a try and see what we can do. I propose that we record a resolution in the Minutes of this Conference, which is a very important one, expressing sympathy or agreement with Dr. Tutin's paper, not necessarily with his solution, because he himself is ready to adopt the best solution, whatever it might be, but expressing sympathy with the

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principles of his paper, and we would recommend the Institutions to take any necessary action to consider the matter further as soon as we have heard the result of the Committee being set up by the Shipbuilding Conference and the shipowners on this subject. Would we be informed by that Committee what the result of that conference is ?

Mr. Wilfred Ayre : I think I can say yes.

President : Do you think that will be in the near future

Mr. Wilfred Ayre : The very near future.

The President : I think the best thing would be if I put a resolution forward in these words :

" Having regard to the fact that Shipbuilding Conference and the General Council of British Shipping are considering the question of tonnage measurement laws, this joint meeting of the Institution of Navel Architects and the Institution of Engineers and Shipbuilders in Scotland wish to record that they heartily support on technical grounds the resolution* passed by the Shipbuilding Conference in February, 1944, and express their readiness to give all technical assistance to the solution of the problem when those primarily concerned with it have come to a decision."

The Resolution was supported by Mr. A. Murray Stephen and Dr. J. M. McNeill and unanimously adopted.

The President proposed a vote of thanks to Dr. Tutin for his paper, and the meeting terminated.

(*To be continued*)

Excerpts from Third Report of the Select Committee on National Expenditure

(Session 1944-45)

Instances of High Payments to Dockers

Introduction

The attention of Your Committee has, on several recent occasions, been drawn to instances of abnormally high payments made both to men and women engaged on work which skill of an exceptional character is not essential. Abnormal payments of this nature are doubtless most likely to result when piece-rates for a new job have to be fixed without previous experience of that job. Their importance lies, not merely in the amount of unjustifiable expenditure which may be involved, but in the fact that the existence of abnormally high earnings, even by a small group of workers, tends to cause a feeling of grievance among other workers and to lead as well to public suspicion or dissatisfaction, often exaggerated by inaccurate rumours. On all these grounds such results must be contrary to the interests of organised labour and of the nation as a whole.

It is against this background that Your Committee wish to draw attention to a few samples cases of unusually high earnings and to draw certain conclusions. The paragraphs which follow give a factual account of some of these cases. The unusually high earnings disclosed are so much in excess of the earnings of others engaged on work requiring equal or greater skill and equal or greater effort, including workers employed in the same factory, that Your Committee feel it to be a matter of serious concern that such things should have been allowed to occur and continue. Even though a relatively small number of workers was concerned in each case the existence of such anomalies represents a breach in the line of an orderly wage policy which might have serious repercussions.

Instance of abnormally high payments to dockers

In July, 1944, information reached Your Committee that high payments had been made in April, 1944, to dockers at a small northern port. A gang of 12 men was engaged in discharging lorries and other American army supplies during the week immediately preceding Easter (1st April—8th April), and the gang was paid for this work at the rate of 4s. per ton (4d. per ton per man) applicable to " Government stores " which the Transport and General Workers Union claimed was the appropriate classification in the absence of a special rate being fixed.* At this port no such special rate had been fixed. The payments per man to the 12 men for the week ended 8th April ranged from £32 12s. 11d. to £46 17s. 9d., and the average for the week was £38 16s. 10d. It should be added that, because of its urgency, a part of the week's work was undertaken on overtime and part also was done on Thursday (6th April) and on Good Friday (7th April), both of which days, at this port, rank as holidays, when the normal basic piece-work rates are increased. The effect of these special conditions on earnings is set out below.

In the absence of a special rate, the " Government stores " rate was claimed by the dockers as the appropriate classification for this traffic, though it appears obvious that the Arbitration Award (dated 5th November, 1941), of the National Joint Council for Dock Labour, which fixed the basic piece-work rate at this port for " Government stores " at 4s. a ton, never envisaged the likelihood that large numbers of vehicles of heavy tonnage would be discharged there, or that such vehicles could be held to come within this classification. This view was subsequently borne out by the findings of the arbitrators in July, 1944.

The port was normally accustomed to handling a narrow range of commodities, and, when piece-work was introduced, a rate for " Government stores " was agreed, as it was understood that this was a classification which would cover much of the cargo likely to be discharged.

The fixing of piece-work rates is in every case the outcome of local negotiation, and it is without doubt unreasonable to expect a small port to negotiate rates through their local joint machinery for goods such as lorries which they are not likely to handle. On the other hand, between November, 1943, and April, 1944, nearly 1,400 tons of vehicles had already been discharged at the " Government stores " rate. But, as other types of cargo were dealt with at the same time, the men's average earnings were not exceptionally high. The wages, however, which were paid in discharging the earlier cargoes might have been taken as some indication of what might happen if the wrong rate was to be continued indefinitely. Your Committee are prepared to accept the fact that abnormally high wages are likely to be paid in exceptional and unforeseen circumstances ; and they have been assured that such an occurrence would not pass unnoticed for any length of time. The real importance lies in seeing that there is an immediate remedy when once an anomaly has become evident.

During the period between November, 1943, and April, 1944, no formal negotiations for revised rate for vehicles took place, but there were informal negotiations in which the men's representative adhered to the contention that the " Government stores " rate was appropriate. On 1st April, a further consignment of 1,600 tons of vehicles arrived—more than had arrived in the four previous months together—and it was the discharging of these at the Government stores rate that made these abnormally high earnings possible. By the end of the week it was apparent that, to provide against the arrival of a further consignment of this type of cargo, an adjustment of the rate for vehicles was essential, and that here was a case where the existing joint voluntary machinery might be expected to operate expeditiously. In fact, the negotiations which followed were extended from May to December, which Your Committee consider to be a quite unreasonable length of time. Your Committee must also note that it was not until 7th August, 1944 (i.e. after Your Committee had initiated its inquiries), that the Ministry issued a circular to all Regional

* Resolution of the Shipbuilding Conference referred to :

1. That the tonnage measurement laws for ships are out of date and are in urgent need of drastic revision in order to remove impediments to desirable development in new ships.

2. That the matter of revision be pressed upon the British Government for urgent discussion with the United States and other maritime nations as a necessary pre-requisite to post-war shipbuilding progress.

* Your Committee are informed by the Ministry of War Transport that the following is a common definition of the classification "Government stores":—Foodstuffs, ammunition and all kinds of equipment for the services, excluding motor vehicles, tanks, aircraft, etc., for which separate rates are normally fixed.

Report of the Select Committee on National Expenditure—continued

Port Directors advising them, in general terms, that, when a cargo cannot fairly be related to a rate in existing piece-work tariffs, either day-rates should be worked until agreed outputs can be settled, or a piece-work rate negotiated and applied retrospectively. Regional Port Directors were also desired to bring home of the local joint committees their responsibilities in this matter.

From the dates given in an Appendix three months elapsed before the matter was considered by the National Joint Council, and the arbitrators appointed by the Council were asked at two separate stages to rule on two separate questions. First, they were asked to decide whether the 4s. Government stores rate should be held to apply to the discharge of vehicles at this port, and, having ruled that this rate should not apply, they were asked, later, to agree on a fair rate for vehicles. Their ruling on the first question was definite. The contention of the Transport and General Workers Union was rejected, and it was recommened that another attempt should be made locally at the port to reach agreement on a suitable rate. As a result of this advice, it might be thought that a local meeting would have been held immediately to comply with the recommendation of the arbitrators, but, in fact, no meeting was held till 13th October, about two and a half months later. Even then no agreement was reached, and on 2nd November the National Joint Council were again brought into the picture to fix a rate. The case was again referred to the same arbitrators, who made their award on 19th December, 1944. This award reduced the number of the gang from 12 to 8 men at 2s. per ton (3d. per ton per man).

Thus, negotiations were being carried on for over eight months, during which time the 4s. rate would have continued to be applicable for the discharge of vehicles had they arrived at the port. In fact, no other consignments did arrive, though in an emergency this might easily have happened. It is possible that, in order to avoid unwarranted expenditure, cargoes might in similar circumstances have to be diverted from their most convenient destination to another port.

Your Committee were supplied by the Ministry with an analysis of the earnings (the highest of the week) of one of the dockers engaged *inter alia* on the discharge of vehicles. From this the following approximate figures may be deduced—

For the week from 12 noon Saturday, 1st April, to 12 noon Saturday, 8th April, this man's total earnings were £45 19s. 9d. He also received 18s. for attendance at times when he did no work.

The total number of hours he actually worked during the week was 70 (his earnings averaging 13s. 2d. per actual hour worked) but, owing to the fact that he worked overtime and during the Easter holiday period (Thursday and Friday), these hours counted as 110 (bringing his average earnings to 8s. 4d. per reputed hour worked).

Of the 70 hours he actually worked, 36 were on vehicles at the rate of 4s. per ton for which his earnings were £36 15s. 6d., and 34 on ordinary cargo at normal rates for which his earnings were £9 4s. 3d. Owing to overtime and holiday adjustments, the 36 hours worked on lorries counted as 72 hours and the 34 hours on ordinary cargo as 38 hours. Thus a fair average for his basic earnings per hour is a follows :—

	£	s.	d.
Per actual hour worked			
on lorries	1	0	5
on ordinary cargo		5	5
Per reputed hour worked			
on lorries		10	3
on ordinary cargo		4	10

That the men's earnings (averaging £38 16s. 10d.) were quite abnormal may be seen from a comparison with corresponding figures for other periods and larger districts. The average weekly earnings (including overtime) of men on the pay-rolls of the National Dock Labour Corporation at all ports where dock labour comes within a National Dock Labour Scheme were £7 10s. 11d. during the first quarter of 1944. The corresponding figure for men at *all* United Kingdom ports (i.e., employed by the National Dock Labour Corporation of the Ministry of War Transport) for the same period was £7 13s. 6d. The average weekly earnings, including overtime, of men in the ports of the district including this port, for the first quarter of 1944 amounted to £8 11s. 0d. During the week ended 8th April (the week in question) the district figures, as a result of the payments now under examination, rose to £13 6s. 11d., but during the next two months receded to an overall average of £9 16s. 2d.

Your Committee note that the Arbitration award of December, 1944, would not materially reduce the earnings. The reduction of the number of the gang from 12 to 8 men and the rate from 4s. per ton to 2s. per ton would mean that future work would be carried out at 3d. per ton per man. i.e., a reduction of 25 per cent. in the earnings of lorries. Taking as an example the earnings of the docker previously referred to, it will be seen that he received £36 15s. 6d. for work on lorries. This figure, reduced by 25 per cent., would become £27 11s. 7½d. His earnings on ordinary cargo (£9 4s. 3d.) would not be effected, and his total for the week would therefore have been £27 11s. 7½d. plus £9 4s. 3d.—£36 15s. 10½d.—a high figure. Against this, however, it must be remembered that he worked exceptionally long hours unloading urgently required cargoes and part of his work was during a holiday period.

New York Foreign Trade Zone.

A Report of the U.S.A. Foreign Trade Board was recently submitted to Congress, forwarding the annual report of the New York Foreign Trade Zone for the calendar year 1943.

This report said considerable business was lost because the total amount of warehouse space was reduced by 80 per cent. when the zone was moved from the original Staten Island site to its temporary quarters in the Hudson River. However, 1943 operating revenues were $504,710, only 25 per cent. less than the $691,000 gross income for the last full year's operation on Staten Island.

The New York report discloses several cases reflecting the shifting trends in world trade resulting from the war. For example, during 1943 more than 5,000,000 pounds of cotton thread, valued at $6,000,000, was shipped from the United Kingdom to the New York zone and redistributed to twenty-six foreign countries, including Latin America, Soviet Russia and British West Africa.

Another development concerned the purchase by African natives of large quantities of cotton piece goods from Mexican mills. Lack of direct service between Mexican and African ports caused a considerable part of this merchandise to be transhipped at the New York trade zone.

The board reported that plans for establishing a zone at New Orleans are rapidly taking form, and that San Francisco is ready to establish a zone as soon as war conditions permit.

Harbour officials at Houston, Tex., and San Juan, Puerto Rico, also have applied for permission to establish zones.

Dundee Harbour Tidal Scale Model.

A conference has been held in the Tay Estuary, attended by Mr. Norman Matheson, general manager and engineer of the Dundee Harbour Trustees, Dr. Allen of Manchester University and Principal Fulton of Dundee University College, at which there was a discussion regarding methods of construction for the tidal model, recently sanctioned by the Trustees, and arrangements for electrical and other supplies necessary for operational purposes.

One of the principal points was the possible difficulty in constructing the framework of the model in timber, as was usual, and it was agreed that steel be considered.

The scale has been fixed at 3-ft. to one mile, and the overall dimensions of the model would be approximately 125-ft. long by 60-ft. wide. It was proposed to construct the model in the Caroline Shed at Eastern Wharf.

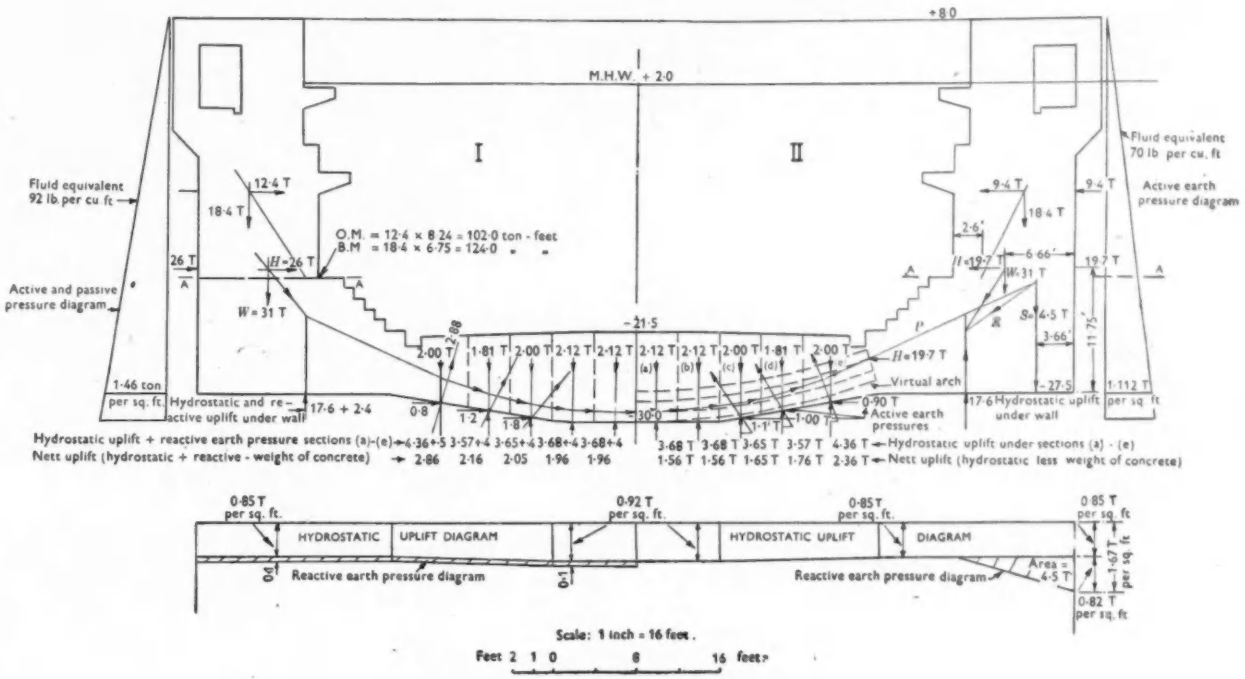
A complete river survey is being undertaken, and already a fair stretch has been covered. It would also be necessary to carry out float observations and to obtain samples of the river water and of the materials forming the river bed. Principal Fulton is to supervise certain of the work and to arrange, if possible, for some of the testing of samples to be carried out under his charge.

Stresses in Dry Docks

By DONALD HAMISH LITTLE, B.Sc. (Eng.), Assoc.M.Inst.C.E.,
and
ELVET JOSEPH EVANS. B.Sc., A.M.I.Struct.E.

(Concluded from page 272)

FIRST METHOD FIGS. 4 SECOND METHOD


+8·0
M.H.W. + 2·0
I
II
Fluid equivalent 92 lb. per cu ft
Fluid equivalent 70 lb. per cu. ft
Active earth pressure diagram
Active and passive pressure diagram
12·4 T
18·4 T
O.M. = 12·4 × 8·24 = 102·0 ton - feet
B.M = 18·4 × 6·75 = 124·0 " "
26 T
H = 26 T
W = 31 T
9·4 T
18·4 T
H = 19·7 T
W. 31 T
S = 4·5 T
- 21·5
2·00 T
1·81 T
2·12 T
1·46 ton per sq. ft.
Hydrostatic and reactive uplift under wall
17·6 + 2·4
0·8
1·2
1·8
30·0
0·90 T
1·1 T
1·00 T
Active earth pressures
Virtual arch
17·6 Hydrostatic uplift under wall
- 27·5
1·112 T per sq. ft
Hydrostatic uplift + reactive earth pressure sections (a)-(e) + 6·36 + 5 3·57 + 4 3·65 + 4 3·68 + 4 3·68 + 4
Nett uplift (hydrostatic + reactive - weight of concrete) → 2·86 2·16 2·05 1·96 1·96
3·68 T 3·68 T 3·65 T 3·57 T 4·36 T ← Hydrostatic uplift under sections (a) - (e)
1·56 T 1·56 T 1·65 T 1·76 T 2·36 T ← Nett uplift (hydrostatic less weight of concrete)
0·85 T per sq. ft.
HYDROSTATIC UPLIFT DIAGRAM
0·92 T per sq. ft.
0·85 T per sq. ft.
HYDROSTATIC UPLIFT DIAGRAM
0·85 T per sq. ft
Reactive earth pressure diagram
Reactive earth pressure diagram
Area = 4·5 T
1·67 T per sq. ft
0·82 T per sq. ft
Scale: 1 inch = 16 feet.
Feet 2 1 0 8 16 feet

CASE I (1) DOCK EMPTY - FULL HYDROSTATIC UPLIFT.

Application of the Methods

Figs. 4 deal with the dock empty and full hydrostatic uplift, The difference in weight between half the dock and half the uplift is 4.5 tons, and it was first assumed that this difference would be uniformly distributed over the foundations and that only the active pressure occured on the back of the wall. The resultant thrust line, however, then came well outside the floor, indicating that the structure is not strong enough so to distribute the loading. By calling on the passive capacity of the earth a safe thrust line is shown in Method I. To arrive at this the (assessed) active pressure of 19.7 tons had to be increased (by trial and error) to 26 tons.

Note.—It was first assumed that the equivalent fluid pressure for retained earth = 70 lb. per square foot, giving resultant thrust = 19·7 tons at back of wall. The resulting pressure-line did not fall safely within the structure. By increasing the equivalent fluid pressure of backfill to 92 lb. per square foot the line of pressures is as shown, and the maximum concrete stresses are regarded as safe. The same result is obtained by maintaining the 70 lb. per square foot equivalent fluid pressure and calling upon the backfill to provide the 6·3 tons extra required for stability in the form of passive resistance.

METHOD I. *Figs. 4.*

Assumptions.

(i) Weight of 1 cubic foot of water = 64·4 lb.
(ii) Weight of 1 cubic foot of concrete = 140 lb.
(iii) Hydrostatic head = M.H.W.
(iv) Retained earth 1 equivalent fluid = 92 lb. per square foot.

	Weight of Concrete Section per linear foot : tons.	Hydrostatic uplift under, per linear foot : tons.
Wall	31·0	17·6
Floor	10·05	18·94

Floor.—For purposes of calculations, floor divided into sections (*a*) . . . (*e*) as indicated.

	Weight of Concrete Section per linear foot : tons.	Hydrostatic uplift under, per linear foot : tons.	Net (Hydrostatic uplift less weight of concrete downwards) per linear foot : tons.
Section (*a*) .	2·12	3·68	1·56
,, (*b*) .	2·12	3·68	1·56
,, (*c*) .	2·00	3·65	1·65
,, (*d*) .	1·81	3·57	1·76
,, (*e*) .	2·00	4·36	2·36

Earth pressures.—Behind wall = 26 tons (11·75 feet from heel of wall) on floor (horizontally between − 27·5 and − 30·0 above O.D.) = 3·8 tons.

Total weight of wall and floor = 31·00 + 10·05 = 41·05 tons.
Total hydrostatic uplift = 18·94 + 17·6 = 36·54 ,,
Difference = 4·5 ,,

Assume this unbalanced downward force is uniformly distributed over foundation (under floor and wall); that is, reactive pressure-distribution is uniform under structure base and equal to 0·1 ton per square foot.

Net upward force on sections (*a*) . . . (*e*) of floor is assessed, and combining with horizontal active earth pressures, if any, on sections, the resultant system of loading, as indicated, is obtained.

Beginning with the horizontal force $H(= 26$ tons) (see note) and vertical force $W(= 31$ tons) the line of resultant pressures is drawn progressively to centre-line of floor.

This line of pressure lies wholly within the structure and the maximum concrete stress (A.T.O.) $= \frac{29{\cdot}8}{3} \times 2 = 19{\cdot}8$ tons per square foot.

Stability of Wall Section at A-A.

Overturning moment = 12·4 × 8·25 = 102 tons per foot.
Restoring moment = 18·4 × 6·75 = 124 tons per foot.

Stresses in Dry Docks—continued

Maximum concrete stress in wall, neglecting tension, at this section

$$= \frac{18{\cdot}4}{3{\cdot}6} \times 2 = 10{\cdot}2 \text{ tons per square foot.}$$

Alternatively (by Method II) the active earth can be maintained at 19.7 tons, and the foundation distribution altered so as to arrive at a safe thrust line within the floor

METHOD II. *Figs. 4.*

Assumptions all as first method, except that only active earth pressure acts (*i.e.* no passive) with a fluid equivalent of 70 lb. per cubic foot.

Active Earth Pressures :—

Behind wall . . . 19·7 tons (11·75 feet from back of wall).
Underside of floor between −27·5 and −30·0 . . } 3·0 tons.

Floor is designed as arch under system of loading as indicated together with horizontal thrust $H = 19{\cdot}7$ tons at abutment. (For a given system of loading, and given horizontal thrust at abutment, only one linear arch can be drawn.)

The "rise" y of the virtual arch = 4·86 feet.

The thickness of the virtual arch = 3·2 ,,

The line of pressure is then drawn in the usual way, lying completely in middle third, as indicated.

The force P at the abutment, together with the resultant R of all forces acting on the wall, gives a combined resultant S vertical (as expected), whose magnitude = 4·5 tons acting at a distance 3·66 feet from back of wall.

Assuming elastic foundation, pressure-distribution diagram is obtained in the usual manner, having a maximum value of 0·82 ton per square foot.

Stability of Wall at Section A-A.

Overturning moment = 9·4 × 8·2 = 77 foot-tons.
Restoring moment .. 18·4 × 6·75 = 124 ,,

Maximum concrete stress $= \frac{18{\cdot}4}{2{\cdot}6 \times 3} \times 2 = 4{\cdot}7$ tons per foot.

Maximum concrete stress at centre-line of arch

$$= \frac{19{\cdot}7}{3{\cdot}2} \times 2 = 12{\cdot}3 \text{ tons per square foot.}$$

Maximum concrete stress at abutment

$$= \frac{22{\cdot}5 \times 2}{3{\cdot}2} = 14{\cdot}0 \text{ tons per square foot.}$$

Method I then represents a lower limit of 0.1 ton per square foot for foundation pressure and an upper limit for pressure on the back of the wall. Method II similarly represents an upper limit of 0.82 ton per square foot for foundation pressure and a lower limit for earth pressure.

Figs. 5 deal with the dock empty and no hydrostatic uplift. Method II indicates a quite common means of assessing the foundation pressure. In it the wall is assumed to act independently of the floor, except that the floor provides the horizontal thrust reaction. This gives a high toe pressure under the wall which cannot possibly exist unless the foundation is completely unyielding, in which case the high pressure would be acceptable.

METHOD I. *Figs. 5.*

Assumptions.

(i) Weight of water = 64·4 lb. per square foot.
(ii) Weight of concrete = 140 lb. per square foot.
(iii) Hydrostatic head = M.H.W. = + 2·00 above datum.
(iv) Equivalent fluid = 70 lb. per square foot for retained earth.

Solving as for Case II (see *Figs. 6*)—

$f_y' = 1{\cdot}05$ ton per square foot.
$f_o = 0{\cdot}467$,, ,, ,,
$f_D = 1.35$,, ,, ,,
$f = 6{\cdot}08$ tons.

Resulting pressure-line lies safely within structure, as indicated.

Maximum concrete stress (at X) $= \frac{19{\cdot}7}{3 \times 1} \times 2 = 13{\cdot}1$ tons per square foot, which is safe.

METHOD II. *Figs. 5.*

Assume (but not correctly) junction between wall and floor can take no shear, and horizontal thrust acts at mid-point, then—

Floor.—Pressure under floor is uniform (approximately) due to own weight; that is, $\frac{10{\cdot}05}{21{\cdot}5} = 0{\cdot}467$ ton per square foot.

Wall.—Net bending moment about centre-line—

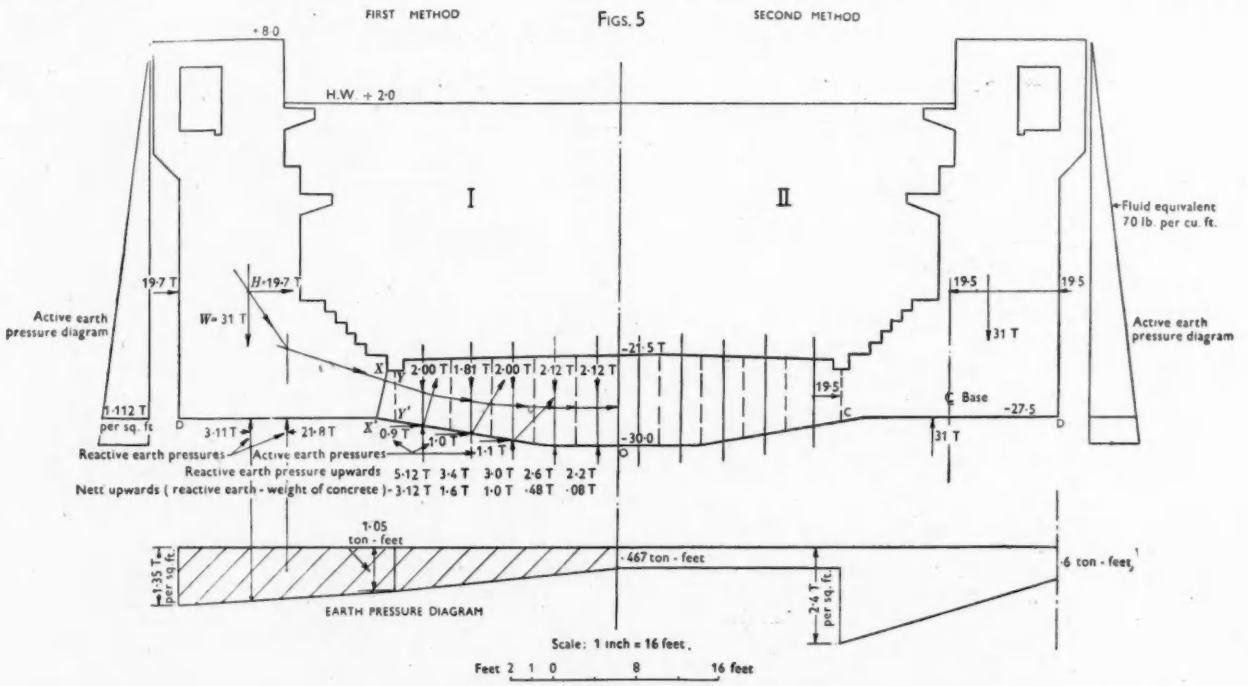
$= 19{\cdot}5 \times 11{\cdot}75 - 19{\cdot}5 \times 2{\cdot}5 = 31 \times 3{\cdot}7.$
$= 230 - 49 - 115 = 66$ tons per foot.

$$f: \frac{31}{20{\cdot}7} \pm \frac{66}{20{\cdot}7} \times \frac{6}{20{\cdot}7}$$
$$= 1{\cdot}50 \pm 0{\cdot}9$$
$$= 2{\cdot}4 \text{ and } 0{\cdot}6.$$

Unless the dock is founded on unyielding rock a sudden change in foundation-pressure from 2·4 tons per square foot to 0·467 ton per square foot cannot take place, and a more likely solution is as first method.

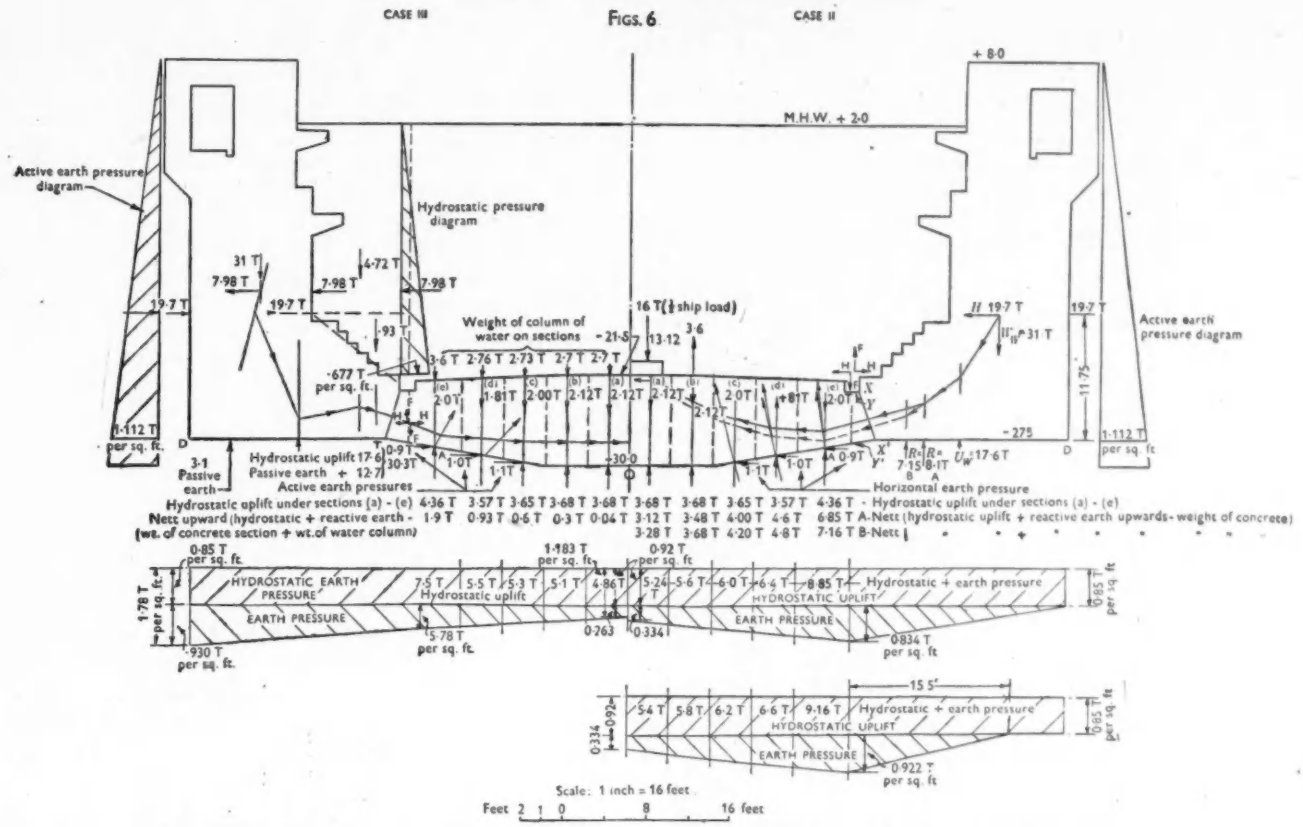
Method I indicates a means of arriving at a more regular form of foundation pressure (that is, the sudden changes of the diagram

FIGS. 5



CASE I (II) DOCK EMPTY - NO HYDRAULIC UPLIFT.

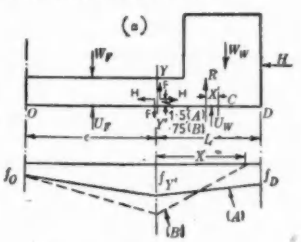
Stresses in Dry Docks—continued


CASE III
FIGS. 6
CASE II
DOCK FLOODED - FULL HYDROSTATIC.
SHIP IN DOCK - FULL HYDROSTATIC.
Active earth pressure diagram
Hydrostatic pressure diagram
M.H.W. + 2·0
+ 8·0
Weight of column of water on sections
16 T (½ ship load)
Active earth pressure diagram
Hydrostatic uplift 17·6
Passive earth + 12·7
Active earth pressures
Horizontal earth pressure
Hydrostatic uplift under sections (a) - (e) 4·36 T 3·57 T 3·65 T 3·68 T 3·68 T 3·68 T 3·68 T 3·65 T 3·57 T 4·36 T - Hydrostatic uplift under sections (a) - (e)
Nett upward (hydrostatic + reactive earth - wt. of concrete section + wt. of water column) 1·9 T 0·93 T 0·6 T 0·3 T 0·04 T 3·12 T 3·48 T 4·00 T 4·6 T 6·85 T A-Nett (hydrostatic uplift + reactive earth upwards - weight of concrete)
3·28 T 3·68 T 4·20 T 4·8 T 7·16 T B-Nett
HYDROSTATIC EARTH PRESSURE
EARTH PRESSURE
Hydrostatic uplift
Hydrostatic + earth pressure
HYDROSTATIC UPLIFT
Scale: 1 inch = 16 feet
Feet 2 1 0 8 16 feet

in Method II are " smoothed " out) ; the details are given in Fig. 6, Case III.

It will be noted, in Method I, that the maximium foundation pressure occurs, under the heel of the wall. From this it follows that the heel would settle most and in so doing would almost certainly bring passive resistance into play on the back of the wall. The effect of this could be found by adopting an earth pressure of (say) 26 tons instead of the active pressure of 19.7 tons.

Case II (Fig. 6) deals with the dock dry and a ship docked, the loading of the latter being equivalent to 32 tons per lineal foot on the centre-line. Centre-line keel blocks are taken as 6 feet wide, so that for half the dock the load becomes 16 tons at 1 foot 6 inches from the centre-line. Full hydraulic uplift is assumed and only the active pressure on the back of the wall.



Figs. 6(a)

The downward load of ship and floor is 26.05 tons (16.0 + 10.05) : the hydraulic uplift under the floor is 19.94 tons, and the net downward load is, therefore, 7.11 tons (26.05—18.94) giving, for a floor width of 21 feet 3 inches, a net foundation pressure of 0.334 ton per square foot. This is taken as the known stress at the centre-line, and by assuming a position for the horizontal thrust to pass through the wall and floor joint, the drawing gives in detail a method for finding the resultant foundation stresses under the toe and heel of the wall. With these known, a thrust line can be drawn. In the first attempt (A), the resulting stress at the floor centre-line is high. By adjusting the position for the thrust at the wall and floor joint, a second resultant (B) is obtained, and these two results indicate that a third attempt would be satisfactory. Concrete stresses at the centre-line are calculated as if there were a construction joint there : actually in a relatively small dock such as this, the floor would almost certainly be placed in one operation from gutter to gutter, in which case a certain amount of tensile stress could be taken at the centre.

This analysis indicates that the structure is strong enough to distribute the ship load so that the maximum foundation pressure does not exceed about 0.9 ton per square foot (net), or 1.75 ton per square foot if hydraulic uplift is not present. Most probably, however, the ground at the centre would be more heavily loaded by the ship than to 0.334 ton per square foot; that is, the maximum net foundation pressure would be less than 0.9 ton per square foot and the floor, not having to distribute the ship load so far, would be less heavily stressed.

If hydraulic uplift should not operate, then the foundation pressures would be the sum of the net pressures and the hydraulic pressure.

CASE II. *Figs. 6.*

Assumptions.

(i) Weight of sea water = 64·4 lb. per cubic foot.
(ii) Weight of concrete = 140·0 lb. per cubic foot.
(iii) Hydrostatic head = M.H.W. (+ 2·00 above datum).
(iv) Equivalent fluid for retained earth = 70 lb. per square foot.
(v) Weight of ship = 32 tons per foot run.

Wall.

Weight per linear foot = 31·0 tons : centre of gravity, 6·66 feet from back of wall.

Hydrostatic uplift under = 17·6 tons.

Active earth pressure at back = 19·7 tons, acting 11·75 feet from heel.

Floor.

Weight per linear foot = 10·05 tons : centre of gravity, 9·9 feet from centre-line of dock.

Hydrostatic uplift under = 18.94 tons.

Active earth pressure between — 27·5 and — 30·0 = 3·0 tons.

Stresses in Dry Docks—continued

For Calculation Purposes.

(*a*) Half-dock only considered, since all loadings are symmetrical about centre-line of dock.

(*b*) yy′ is taken as construction joint between floor and wall (actually xx′ is construction joint).

Consider floor and wall independently.

Floor.—Assuming floor to be sufficiently rigid to spread ship load uniformly over base, the reactive earth pressure is uniform and = 0·334 ton per square foot ; that is f_y' for floor = 0·334 ton per square foot.

Wall.—Considering now the stability of the wall as a structure distinct from the floor, and assuming that the foundation is elastic, the reactive stress under toe of wall = f_y' for wall = 5·1 tons per square foot, but actually construction joint xx′ is such as to prevent differential settlement, since f_y' for wall is greater than f_y' for floor, when floor and wall are treated independently ; that is, " sympathetic " action across joint will adjust these values until $f_{(floor)} = f_{(wall)}$ at the point y′, that is, there is no discontinuity in pressure diagram at y′.

Let the horizontal and vertical components of the resultant (internal) force across section yy′ be H and F respectively. From statics H is constant and = 19·7 tons for any position of the resultant on yy′. F, of course, varies.

The problem is to find a point of application of this resultant on yy′ giving stability.

(A) *Try a Point 1·5 foot above Base-Line X′D of Wall.*

Let f_y' denote reactive stress in earth foundation at y′ ;
f_o " " " " " " " " 0. ;
f_D " " " " " " " " D. ;
$y'_D = L$;
and $oy' = e$.

Let W_w denote weight of wall section of unit width ;
W_F " " floor " " " "
U_w " hydrostatic uplift under wall ;
U_F " " " " floor ;

R denote resultant (upward) force—acting at a distance x from C, the centre of wall base-line $y'D$—of all forces acting on wall = $(Ww - Uw - F)$;

Rx " moment of resultant about C, can be found in terms of known quantities and F, the only unknown.

For wall, applying the well-known elastic formula $f = \frac{W}{A} \pm \frac{M}{Z}$, which can be written in the form $f = \frac{R}{L} \pm \frac{6Rx}{L^2}$, for strip of unit width,

$$f_y' = \frac{R}{L} + \frac{6Rx}{L^2}$$

$$f_D = \frac{R}{L} - \frac{6Rx}{L^2}$$

R and Rx having already been obtained in terms of F, the above can be written in the form

$f_y' = \alpha + BF$ . . . . (1)
$f_D = \gamma + \delta F$ . . . . (2)
} where α, B, γ, and δ are known constants.

From stress diagram, for equilibrium of floor,

$$(f_y' + f_o)\frac{e}{2} = W_F - U_F + F + S, \text{ where } S \text{ denotes ship load}$$

or $f_y' + f_o = \xi + \zeta F$ . . . . . (3) where ξ and ζ are known.

Let $f_o = 0{\cdot}334$ ton per square foot (4)

Solving the equations (1) . . . (4) the required values of f_o, f_y', f_D, and F are as follows :—

For (A) f_o = 0·334 ton per square foot
f_y' = 0·834 ton per square foot
f_D = − 0·05 ton per square foot = − 0·00 (say)
F = 5·3 tons.
} The resulting pressure-line is as indicated on structure (in full line).

(B) *Try a Point 0·75 foot above Baseline* X′D *of Wall.*

Then f_o = 0·334 ton per square foot
f_y' = 0·922 ton per square foot
X = 15·5 feet (see *Fig. 1*)
F = 6·25 tons
} The resulting pressure-line is as indicated on structure (broken line), which is better.

For (B) maximum stresses at A $= \frac{19{\cdot}5}{2{\cdot}25} \times 2 = 17{\cdot}3$ tons per square foot.

" " " B $= \frac{19{\cdot}5}{1{\cdot}5} \times 2 = 26$ tons per square foot.

It is clear that a point can be found such that stress at A = stress at B ; this is the most stable condition. Then maximum stress = 21 tons per square foot (approximately), which is safe.

Case III (Fig. 6,) deals with the dock flooded, the method being as for Case II. The maximum foundation pressure occurs at the heel of the wall, which again suggests that passive resistance might be developed on the back of the wall ; that is, the horizontal thrust of 19.7 tons would be increased, and the maximum foundation pressure reduced—the latter because of more even distribution.

CASE III. *Figs. 6.*

(i) Weight of sea water = 64·4 per cubic foot.
(ii) Weight of concrete = 140 lb. per cubic foot.
(iii) Hydrostatic head = M.H.W. = + 2·00 above datum.
(iv) Equivalent fluid = 70 lb. per square foot for retained earth.

Solving as for Case II—

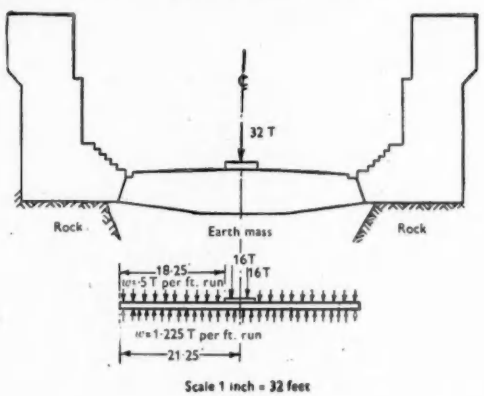
f_y' = 0·930 ton per square foot.
f_o = 0·263 ton per square foot.
f_D = 0·578 ton per foot.
F = 3·45 tons.

Resulting pressure line as drawn lies safely within structure.

Maximum concrete stress at (A) $= \frac{11{\cdot}72}{3 \times 1{\cdot}25} \times 2 = 6{\cdot}3$ tons per square foot, which is quite safe.

The above-mentioned three cases are for fairly uniform ground conditions and indicate that in no circumstances will the internal stresses in the concrete exceed 21 tons per square foot, nor the foundation pressures 1.8 ton per square foot. At the centre of the dock the foundation is 38 feet below cope-level, and if this should also be existing ground-level and ground is taken as weighing 1 cwt. per cubic foot, then the existing pressure at new foundation-level—due to the weight of overlying earth—is 1.9 ton per square foot. Thus the design of the dock is such that it can virtually float in the ground under all conditions of loading so as not to impose on the ground any more severe loading than it already has to carry in its present undisturbed state due to its own weight.

Figs. 7 illustrate the unusual condition of rock outcropping under the two walls, but dipping away from the floor.



Figs. 7

Case IV. Ship in Dock. No Hydraulic Uplift. Walls on Yielding Rock. Floor on Yielding Earth

If hydraulic uplift does not act, then (Case IV) the floor functions as a raft and in order to spread the ship load uniformly it must be reinforced, the reinforcement, however, being somewhat nominal.

CASE IV. *Figs 7.*

The walls are in stable equilibrium and exert no forces on dock floor. Forces acting on floor are :—

(i) Weight of concrete floor downwards = 0·5 ton per foot.
(ii) Weight of ship downwards = 32 tons.
(iii) Reactive earth pressure upwards = 1·225 ton per foot.

It is assumed that the floor is sufficiently rigid to distribute ship load of 32 tons uniformly over foundation.

Considering half floor (see Loading Diagram)

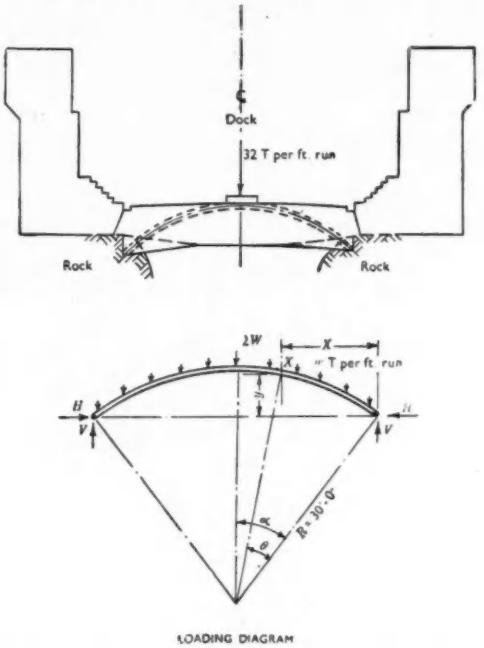
$$M_{(max)} = (1{\cdot}225 - 0{\cdot}5 \times \frac{18{\cdot}25^2}{2} = 121 \text{ tons per foot.}$$

If f_s = 18,000 lb. per square foot
f_c = 750 lb. per square foot
d = 8 feet 3 inches

$$A_s = \frac{121 \times 2{,}240 \times 12}{18{,}000 \times 0{\cdot}86 \times 99} = 2{\cdot}12 \text{ square inches ; that is, } 1\tfrac{1}{4}\text{-inch diameter at 6 inches centre to centre : safe.}$$

Stresses in Dry Docks—continued

Alternatively (Case V), if the rock is sufficiently close to the floor to serve as an abutment by a reasonable amount of additional concreting, the floor can arch from wall to wall, provided the concrete mix is good enough to take a stress of 31 tons per square foot. This stress is a maximum upper limit inasmuch as the dead weight of the floor, originally deposited on the foundation, is included as part of the arch load ; that is, it is assumed, in effect, that the earth foundation will shrink or settle away from the floor.



Case V. Ship in Dock. No Hydraulic Uplift. Walls on Rock. Floor Spaces across Rock Abutments

CASE V. *Figs. 7.*

Regard floor as a freely supported slab, carrying own weight and ship-load $M_{max} = \{26 \times 19 - 10 \times 10\}$ approximately $= 494 - 100 = 394$ foot-tons.

Slab to be designed as arch (as indicated in loading diagram).

Assuming doubly pin-jointed, structure has one redundancy. Let it be H. If U denote total strain energy due to bending in rib, then

$$\frac{\partial U}{\partial H} = \frac{2}{EI}\int_0^{\alpha} Mx\frac{\partial Mx}{\delta H}ds = O = \frac{V}{4}[4\cos\alpha - 3\cos 2\alpha - 2\alpha\sin 2\alpha - 1]$$

$$- \frac{H}{4}[4\alpha + 2\alpha\cos 2\alpha - 3\sin 2\alpha] - \frac{\omega}{2}\left[\frac{4}{3}\sin^3\alpha - \frac{\sin\alpha}{2}\right.$$

$$\left. + \frac{\sin\alpha\cos 2\alpha}{2} - \alpha\sin\alpha\sin 2\alpha - \frac{\alpha}{2}\cos\alpha - \frac{\cos\alpha\sin 2\alpha}{2} + \sin 2\alpha\right]$$

Giving $H = 46$ tons [$\alpha = 47\frac{1}{2}$ degrees : $R = 30$ feet].

Bending moment at X $= Vx - Hy - \frac{\omega x^2}{2}$

Bending moment at centre-line $= VR\sin\alpha - H(R - R\cos\alpha) - \frac{\omega R^2\sin^2\alpha}{2}$

For $\alpha = 47\frac{1}{2}$ degrees, $R = 30$ feet (as indicated in *Figs.* 7).

Bending moment at centre-line $\simeq 0{\cdot}00$: that is, direct thrust only $\equiv 46$ tons.

Maximum stress in concrete at centre-line $= \frac{46 \times 2}{3} = 31$ tons per square foot.

Maximum M at $\theta = 37\frac{1}{2}$ degrees ; that is, $M_{max} = -56{\cdot}5$ tons per foot.

Therefore the thrust is $\frac{56{\cdot}5}{46} = 1{\cdot}23$ foot off centre-line of assumed arch rib, or about

2·0 feet from edge of floor, whence stress $= \frac{46 \times 2}{3 \times 2} = 15{\cdot}3$ tons per square foot.

Such conditions as are covered by Cases IV and V are not likely to be common, but might occur over short lengths on a site—especially in the tropics—and the analyses show that they can be overcome either by nominal reinforcement or by local thickening of the floor and local increased quality of concrete. Local piling, with its attendant disruption of the even sequence of normal excavating and concreting processes, is not necessary.

Acknowledgment

The Authors are employed in the Civil Engineer-in-Chief's Department, Admiralty, and have to thank the Board of Admiralty for permission to publish this Paper.

Publications Received

There has come to hand from Messrs. Fay, Spofford and Thorndike, Engineers, of Boston and New York, U.S.A., a statement in pamphlet form on **Air Transportation and Airports,** prepared for communities interested in Airport Planning. As explained in a Foreword, it is intended " to furnish them with information to crystallise their thinking and to enable them to progress towards a definitive objective." The advice given is expert and sound, but as the subject only relates to land aircraft, it falls outside the sphere of this Journal. There is no discussion of the special accommodation requirements of sea planes or flying boats.

The Port of Tel-Aviv. A pamphlet reprint of an article by Herzl Zuckerman in *Palestine and the Middle East.* Pp. 10. Mr. Zuckerman is Acting Manager and Secretary of The Marine Trust, Ltd., at Tel-Aviv. We hope to give some notice of this port at a later date.

Port Chatter is a publication of the employees of the Board of Commissioners for the Port of New Orleans. We have received a copy of No. 1 issue dated February, 1945, and find it replete with local items which cannot fail to be of interest to the staff. It records the award of certificates for 25 or more years service with the Board. First in order of seniority was Mr. Tiley S. McChesney with 44 years to his credit, Mr. McChesney has held the office of Treasurer and Assistant Secretary from 1907 till 1931, when his services were continued in an advisory capacity.

Restoration of Facilities at the Port of Montreal

The president **(Mr. L. Eric Reford)** of the Shipping Federation of Canada, has made a pressing appeal for the resumption of full facilities for commercial shipping at the Port of Montreal. At the recent annual general meeting of the Association at Montreal Mr. Reford said:

" A reflection of the general improvement in the shipping situation has been the moderate increase during the season of 1944 in the number of ocean vessels utilising St. Lawrence ports. It is to be hoped that the various factors which made it impracticable fully to resume normal shipping movements in the St. Lawrence this past year will not be operative during next season, and I would therefore like to take this opportunity of urging that the National Harbours Board make available the full facilities at Montreal. During the time that ships were unable to come to this port it was quite proper that the sheds should be utilised for other purposes connected with the war effort, but as shipping continues to occupy the highest priority it is only reasonable that the complete loading facilities of the port should again be at the disposal of shipping which they were originally designed to serve.

" Our Canadian Atlantic ports have continued to handle a very large volume of essential export cargoes, but their capacity is limited and it is most desirable that the fullest use of the port of Montreal should be obtained at the earliest possible date if the shipment of war materials—and we hope in the not too distant future of reconstruction supplies—is to be expedited.

Regional Port Planning

Outline Plan for Merseyside

Introduction

MR. LONGSTRETH THOMPSON was commissioned in February, 1943, by the Minister of Town and Country Planning to prepare, in consultation with a Technical Committee of the Merseyside Advisory Joint Planning Committee, an Outline Plan for Merseyside, Mr. C. H. James being associated with him as architectural adviser. The plan has now been published and is obtainable through any bookseller or direct from H.M. Stationery Office, Kingsway, London, W.C.2. The price is 7s. 6d. (inland postage 7d.). The Plan, as thus published, includes six maps, one of which, by permission of the Controller of H.M. Stationery Office, is reproduced here.

The Plan has not yet received Ministerial approval, but is issued for the purpose of evoking discussion of the proposals. The following is an abridgement of the official summary of the scheme, restricted to port features and activities.

The Plan is for Merseyside; but it is also of national interest. It is concerned with the future of one of the principal ports in the country and in the world.

It reviews the group of communities that have grown up around the port and suggests, from an essentially practical standpoint, the main lines upon which their reconstruction and development should proceed in order to build up a satisfactory urban and rural structure for the region as a whole. Based upon the conception of Merseyside as a single, though highly complex, organism, its organic unity distinguishes it fundamentally from any co-ordinated mosaic of local plans.

It deals with a region of considerable extent, reviewing a group of existing communities and suggesting a practical organic structure for their future. It is thus distinct in character from any plan that could be drawn up by a single Local Authority or composed by an agglomeration of such local plans. It embodies proposals for meeting, in different parts of the Merseyside area, all the major problems which, in other British towns and cities, face the town-planner of 1945—the reconstruction of war-damaged and obsolete districts; the increase of employment by the introduction of new and more varied industries; the preservation of fertile land for agriculture; the dispositions to be made for "overspill" of population; the equipment of residential groups with resources for true community living; the improvement of traffic facilities by rail and road, on water and in the air; the preservation of historic and beautiful places; the enlistment, if often for new purposes, of sound building traditions and the use of appropriate building materials.

Extent of the Region

The region includes the central group of Merseyside towns and the adjacent areas of Lancashire and Cheshire whose common interests are focussed upon the Port of Liverpool. The area covers 450 square miles extending from the borders of Preston to the borders of Chester and from the estuary of the Dee and the Lancashire coast to a line running 5 miles westward of Warrington, Wigan, Chorley and Preston. Twenty-four Local Authorities (15 in Lancashire and 9 in Cheshire) are included.

Purpose and Scope

The purpose of the Plan is to formulate a co-ordinated policy for the future development of the communities in Merseyside. Its main objectives are to secure the best possible living conditions for the inhabitants and the best possible working conditions for the port, industry and agriculture upon which the prosperity of the region and the livelihood of its inhabitants depend. The function of the Plan is to provide a strategic framework within which the tactical operations of local planning can be carried out by each authority to satisfy its own particular requirements in general harmony with a definite regional policy.

General Policy

The essential features of Merseyside comprise:—

(a) The central compact group of towns that have grown up round the **Port of Liverpool,** and are primarily dependent upon it and the industries connected with it.
(b) The detached residential towns which, fulfilling the functions of dormitory suburbs, recreational and holiday resorts, and homes for those who have retired from business, are offshoots of Central Merseyside.
(c) The detached industrial towns which, though they have strong ties with Merseyside, are largely self-contained communities.
(d) The exceptionally fertile agricultural land which surrounds Central Merseyside.
(e) The coal field extending to St. Helens southwards to the outskirts of Widnes.

Central Merseyside contains nearly 75 per cent. of the population of the region. It occupies 45 square miles in Lancashire, with 14 miles of continuously built-up river frontage, and an area of 15 square miles in Cheshire with a river frontage of about 8 miles. This complex group of towns has grown as the direct outcome of the functions of a seaport.

The decentralisation and regrouping of the population displaced by the reconstruction of the congested areas of Central Merseyside, in conjunction with the distribution and location of the new industrial areas, constitute the main planning problem. The policy of creating satellite towns, though sound in principle, is not suited to the particular conditions of Merseyside.

The general plan recommended is for the improvement of the existing urban structure and its extension in the form of urban spurs, with wide wedges of open land separating them; combined with development of existing residential suburbs and detached towns.

CENTRAL MERSEYSIDE

(1) **Port Area.** The extensive and highly complex organism of Merseyside owes its existence to and is primarily dependent upon its function as a port and the maintenance of this function is of vital importance. The Port of Liverpool is the second greatest port in the United Kingdom and in 1938 its import trade was £162 millions, and export trade £139 millions.

The greater part of the port traffic is on the Liverpool side and is likely to remain on that side owing to its more favourable position in respect of communications with the main industrial centres, but development of the export trade of the Birkenhead Docks would be advantageous from the regional no less than from the local standpoint.

In the present circumstances no long-term estimate of the future requirements of the port can be made. There should, however, be provision in the planning scheme for an extension of the dock system which may become a necessity at a later date. This extension would be immediately north of the Gladstone Docks, and it is recommended that the foreshore and land extending back to Crosby Road South for a distance of about half-a-mile beyond Gladstone Docks should be treated as a Reserve Port Area.

The programme of modernisation, which is the policy of the Mersey Docks and Harbour Board, requires an immediate extension of the "Port Area" to provide space for roadways, railway sidings and warehouses. It is recommended that a strip of land behind the North Docks, already largely occupied by warehouses and marshalling yards, should become part of the "Port Area." The proposed replanning entails the re-accommodation elsewhere of the small population resident there, and the allocation of land for the industry displaced. Provision for the latter is made in a proposed Industrial Zone adjoining the new "Port Area"; any appreciable extension behind Liverpool South Docks does not

Plan of Merseyside, reproduced from "Merseyside Plan, 1944," by permission of the Controller of H. M. Stationery Office

Regional Port Planning—continued

appear to be feasible. In the case of the Birkenhead Docks the existing "Port Area" is sufficient to allow for any probable expansion.

(2) **Industrial Areas**. The outstanding characteristic of the industries in Central Merseyside is that the bulk of them are dependent on the port, and are, therefore, firmly anchored to their present location.

The principal industries fall into five categories:

(a) Industries and services, mainly services involved in the working of the Port.
(b) Industries using raw materials imported through the Port.
(c) Ancillary industries such as tin-box making, packing-case making, cooperage, etc.
(d) A fourth group, including the distributive trades, national and local government services, railway and road transport, building, printing, publishing, etc.
(e) A fifth set of industries located in Merseyside because of the export facilities the Port provides.

Central Merseyside has a different industrial structure from the country as a whole. It has a relatively small share of small and medium-size factories and a relatively large share of big factories each with 1,000 or more employees.

The location of industry in Central Merseyside reflects the degree to which the various industries are dependent on the Port. Shipbuilding and repairing industries directly concerned with shipping, and those using a high proportion of imported raw material occupy sites in the dockside and water front zones. Constructional engineering, newsprint manufacture and industries derivative from the primary industries are also located in this zone.

Many of the secondary industries occupy sites on the outskirts of Bootle and Liverpool, where they have congregated in more or less compact groups. These industrial areas are, on the whole, well placed for transport, and in relation to residential areas; some of the older ones are fully occupied to the point of congestion.

The Report then goes on to discuss the need for new industries independent of the port and of the fluctuation of foreign trade.

In reference to railways it is stated that the main requirements are:

(a) Improved facilities for dealing with traffic at the docks.
(b) Provision for dealing with goods traffic in connection with the proposed new industrial areas; and
(c) Development of the suburban passenger services.

Plans for (a) have been prepared by the railway companies in consultation with the Mersey Docks and Harbour Board. As to (b), all the proposed industrial areas have been located on existing railways, and provision for dealing with the goods traffic is mainly a question of traffic capacity which, it is understood, presents no difficulties.

Conclusion

In conclusion, there are recommendations on the means of giving effect to the Plan.

The Outline Plan is essentially a regional plan. It is designed to satisfy the collective requirements of the communities that together constitute Merseyside, and it will need their collective endeavour to give it effect. The best course to follow would be for the constituent authorities to set up a Joint Executive Committee to make a statutory Regional Plan on the lines of the Outline Plan submitted. By this means the main structure of the plan would be settled jointly and its subsequent observance secured, while the detailed local planning of their own areas would be left in the hands of the individual authorities. A standing joint committee, to whom questions of principle and policy could be referred, is desirable, and it is suggested that the Joint Executive Committee should remain in being for this purpose after the Statutory Outline Plan has been completed.

More detailed observations are contained in the Report itself from which the following verbatim extracts are taken :—

CENTRAL MERSEYSIDE PORT AREA.

The present extensive and highly complex organism of Merseyside owes its existence to and is still primarily dependent upon its function as a port. The maintenance of this function at full efficiency is, accordingly, a matter of vital importance and must be given first consideration.

Although the Port of Liverpool extends, nominally, as far up the Mersey as Warrington, its activities are concentrated at Liverpool and Bootle, and at Birkenhead. The docks extend continuously for seven miles along the river front of Liverpool and Bootle. Those at the south end have shallow entrance channels and their use is restricted to vessels of light draught; the largest and most modern are at the northern end culminating in the Gladstone Docks completed in 1927. On the Cheshire side the Birkenhead docks run inland for over two miles on the site of an old creek, now the Great Float, at the far end of which lies Bidston Dock, the latest addition to the system, completed in 1933.

In addition to the main dock system, which is owned and administered by the Mersey Docks and Harbour Board, there are docks at Garston, 5½ miles south of Liverpool Pierhead, owned by the L.M.S. Railway Company and, on the Cheshire side, there are the docks occupied by Messrs. Cammell Laird in connection with their big shipbuilding yards, and Bromborough Dock owned by Unilevers. At Eastham, 5½ miles south of the Great Float and opposite to Garston, is the entrance to the Manchester Ship Canal. As far as Garston and Eastham, channels are kept open by constant dredging; beyond, only a few small shallow draught vessels go, at high tide, to quays at Widnes and Runcorn where there are also entrances to the St. Helens Canal and the Weaver Canal respectively.

Ellesmere Port on the Ship Canal is technically part of the Port of Manchester.

*The Port of Liverpool is one of the chief ports of the world; it ranks, after London, as the second port of the United Kingdom and during the war has been of first importance. A comparison of its trade in 1938, in millions of pounds stering, with that of London and the three other ports in the United Kingdom which stand next to it in importance, is given below:—

	Imports £ *millions*	*Exports* £ *millions*	*Total* £ *millions*
London	381	172	553
Liverpool	162	139	301
Hull	60	27	87
Southampton ...	30	32	62
Manchester ...	45	13	58

As will be noticed, London had in 1938 more than twice the import trade of Liverpool, but Liverpool was not far behind in exports; in fact, if the re-export of imported goods be excluded, the export trade of the two ports was almost level.

The bulk of the export trade (£120 millions out of a total of £139 millions) was in manufactured goods of which the two main groups are textiles, and metals and machinery, with chemicals as an important item in the miscellaneous group. The imports are made up principally of food, drink, and tobacco (£77.6 millions) and the raw materials used in industry (£63.5 millions). In the former group, grain for flour milling, sugar for refining, and tobacco and, in the latter group, tin ore, seeds and nuts for oil, timber, hides and skins, are all manufactured in Merseyside. Cotton, the principal import, is manufactured in the adjoining Manchester region and, in the form of yarns and textiles, constitutes also the principal export.

The greater part of the port traffic is on the Liverpool side; only 10 per cent., by value, of foreign imports and 20 per cent. of foreign exports normally pass through Birkenhead. Of the 25,400 persons ordinarily employed at the Docks (18,000 dockers; 2,000 carters, motormen, tugmen and bargemen; 5,400 staff), the distribution is roughly as follows:—

Liverpool South	6,900
Liverpool North	7,300
Bootle	6,400
Birkenhead	4,800

*The figures in this and the following paragraph are derived from a more detaied summary of the trade of the port given in the "New Handbook of Social Statistics relating to Merseyside" prepared by the Social Science Department, Statistics Division, of the University of Liverpool, 1940: published by the University Press of Liverpool.

Regional Port Planning—continued

While the preponderance of the trade of the port is likely to remain on the Liverpool side, owing to its more favourable position in respect of communications with the main industrial centres, particularly those in the north and in Lancashire and Yorkshire, development of the export trade of the Birkenhead Docks would undoubtedly be advantageous from the regional no less than from the local standpoint. It is claimed by Birkenhead, that one of the main obstacles to the fuller development of trade on their side of the Mersey would be removed by the abolition of the Mersey Tunnel tolls, thus equalising shipping costs throughout the Port. There is much to be said for this view, but it raises general issues outside the scope of this report. The subject is at present under examination by the Dock Access Committee.

The future requirements of the Port necessarily depend upon what the future trade of the Port is likely to be. If its future prospects were to be assessed on the basis of the general tendencies of the last 30 or 40 years they would not be too encouraging. For, although the total tonnage of shipping entering and leaving the port in 1938 (35.4 million tons) was slightly greater than in 1914 (31.3 million tons), the net tonnage of shipping with cargo has remained (except during the Great War and the period immediately following it) practically constant and the increase in the total tonnage in wholly due, therefore, to an increase in tonnage in ballast. Similarly, the total value of imports and exports which rocketed up during the war of 1914-18 and the short boom at inflated prices that followed—and subsequently sank into the trough of the 1932 depression—was in 1938 slightly below the level of 1914. Moreover, the share of the Port of Liverpool in the trade of the United Kingdom, during the same period, had declined from 27.7 per cent. to 20.8 per cent., and its share in shipping from 12.8 per cent. to 11.6 per cent. This decline is due in part to an increase in the trade of the Port of Manchester and in part to industrial inactivity in the north-west of England*

Whether the post-war trade of the port will remain more or less static, or whether it will expand or contract will depend upon the state of industry in North-west England and in West Yorkshire and the North-west Midlands as well. This in turn will depend upon national policy with regard to the territorial distribution of the different types of industry and the extent to which the overseas trade of the country as a whole can be recovered and extended. Ultimately, it is a question of Great Britain's position in the post-war world economic system.

In the present circumstances, therefore, no long term estimate of the future requirements of the port can be made. Meantime, the policy of the Mersey Docks and Harbour Board is to bring their existing equipment up to date. The Chairman of the Board, at the annual meeting in December, 1943, explained that they had since 1939, in spite of all the handicaps of war conditions, frequently handled monthly volumes of cargo greatly in excess of those dealt with in normal times and he went on to say: " It seems to us, therefore, that it would be both improvident and unwise to contemplate at this time any large extensions or additions to the dock area, and that our proper policy is to do all in our power to improve the existing docks by modernisation. If under present conditions we can handle more ships and larger cargoes than pre-war, an intelligent policy of modernisation should give us a substantial margin in handling post-war traffic when all the other ports are doing their normal share of the country's trade."

Taking a longer view, however, it would be still more improvident to neglect to make provision in the planning scheme for an extension of the dock system that may quite well become a necessity in the not distant future. If and when it is required it would naturally take place immediately north of the Gladstone Docks, and, as a precautionary measure, it is recommended that the foreshore and the land back to Crosby Road South, for a distance of, say, half-a-mile beyond Gladstone Docks, should be treated as a Reserve Port Area. The land in question is already in the ownership of the Docks and Harbour Board.

The programme of modernisation, however, does require an immediate extension of what may be called the " Port Area " in order to provide behind the docks more space for roadways, railway sidings and warehousing for the better handling of cargoes. After consultation with the Dock Access Committee, who have had the matter under detailed consideration, it is recommended that the land behind the North Docks, and lying between the present Dock Road and the line of Rimrose Road, Derby Road and Great Howard Street, should become part of the " Port Area." This strip of land is already largely occupied by warehouses and the railway companies' marshalling yards and good stations, but there are also industrial premises and isolated groups of houses; many of the buildings have been destroyed or badly damaged by enemy bombing. The proposed re-planning entails the re-accommodation elsewhere of the small population resident there—a desirable move in any case—and the allocation of alternative land for the industry displaced. Provision for the latter is made in the proposed Industrial Zone immediately adjoining the boundary of the new " Port Area." Rimrose Road, Derby Road and Great Howard Street are proposed to become the future main dock distribution road, with a considerably increased width.

Any appreciable extension of the " Port Area " behind the Liverpool South Docks does not appear to be feasible; in the case of Birkenhead Docks, the existing " Port Area " is sufficient to allow for any probable increase in trade and no provision for its extension appears to be necessary.

†Information derived from an analyis of the trade of the Port of Liverpool contained in "The Distribution of Population and the Location of Industry on Merseyside," by Wilfred Smith: University of Liverpool, Social Science Department, Statistics Division, 1942: University Press of Liverpool.

Cobh Harbour Proposals.

At a recent meeting of the Cork Harbour Board a letter from the Eire Department of Industry and commerce was read referring to the Cobh Development Association's proposals for an extension of the deep-water quay there and the creation of a free port with the department's reply. This pointed out that the extensive post-war development schemes submitted by the Cork Harbour Board did not include the Cobh proposal and it was primarily for the owners of existing quays and local interests concerned to prepare a scheme. As regards a free port, when this question was again considered the claims of Cork port would not be overlooked.

In regard to this matter a letter from Mr. S. Fitzgerald suggested examining the possibility of creating a free Customs zone within the port. The board decided to refer this suggestion to a committee of the whole board, together with reports from the engineer and harbourmaster on the Cobh quay proposal, and a further suggestion to re-examine the Cobh development scheme prepared several years ago by Mr. Nicholson, the consulting engineer.

Port of London River Emergency Service.

London's amphibious Civil Defence Force—the Port of London River Emergency Service—" stood down " on March 31st. Organised after the Munich pact by the Port of London Authority on 3rd September, 1939, 1,500 personnel with about 170 craft, including fourteen large ambulance vessels, mustered to perform on London's river highway the services deputed to the land Civil Defence organisation. Later responsibility for the R.E.S. was assumed by the Ministry of Home Security, while administration was continued by the P.L.A.

The R.E.S. was in action during the worst period of the " blitz " and also performed valuable services for the port naval and harbour services. The R.E.S. was progressively reduced in strength, many officers graduating into the R.N.V.R., and for some time past has consisted of about 80 volunteers in all walks of life who provided by rota crews for patrol vessels, throughout day and night and were available for any purpose.

In connection with the occasion, the P.L.A. held an informal reception at which Capt. Sir Ion Hamilton Benn, Bart., C.B., D.S.O., T.D., conveyed the thanks of the Port Authority and of the London Regional Commissioners to the masters and crews, some of whom had given their services for over four years. Each man also received a Certificate of Service from Sir Douglas Ritchie, M.C., Chief Executive, London Port Emergency Committee.

The London Dockers' Strike

Excerpts from Report of Committee of Inquiry

At the moment of going to press there has been received the Report, just issued to the public, of the Committee of Enquiry which, under the chairmanship of Lord Ammon, has been investigating the circumstances of the strike at the London Docks in March last. The Committee consisted of representatives of the Port Employers in London, the National Association of Port Employers, the Transport and General Workers Union, the National Amalgamated Stevedores and Dockers and the National Dock Labour Corporation.

The Committee state that evidence, both written and oral, was presented on behalf of various organisations whose representatives were examined on the statements submitted by their organisations. In addition, evidence was obtained from a number of individual witnesses. As was to be expected, some of the evidence was of a critical character, but, it is added, "We are pleased to report that certain constructive proposals designed to make for smoother working of the London Dock Labour Scheme were also submitted for our consideration."

The strike originated, the Committee state, in the men's feelings of resentment against the alleged harsh exercise of discipline under the Port of London Dock Labour Scheme; it was brought to a head by the transference by the National Dock Labour Corporation of the Royal Docks Control Point (at which attendance is proved) from two small huts outside the Victoria Dock Gate to the Sector Office approximately 250 yards away, but inside the dock-gate.

The new Control Point was opened on March 1st, 1945, after the men had been given notice of the proposed change, and on that day some 500 men at the Royal Dock refused to proceed to work in protest. Various other docks rapidly became involved, and by March 6th work throughout the Port of London, including Tilbury, had completely stopped. The stoppage, which was entirely unofficial and against the advice of the unions, continued until March 8th at Tilbury and March 9th elsewhere in the Port when, following the undertaking that an enquiry would be held into their alleged grievances, the men returned to work.

After full and sympathetic consideration of all the facts, the Committee are unanimously of the opinion that the strike was wholly unwarranted and all the more regrettable because of the established machinery which is fully capable of considering and dealing with any matter in dispute.

In fairness to all concerned, we feel (they say) that it should be pointed out that the Port of London Dock Labour Scheme, which was drawn up and agreed by both sides of the Port Transport Industry in London and approved by the Minister of Labour and National Service under the Essential Work (Dock Labour) Order, provides in Clause 2 (b) that one of the principal objects of the Dock Labour Scheme is—

> "To regularise Port Transport Work by . . . the provision of control points for the allocation of Port Transport Workers. . . ."

We were informed on behalf of the men that their opposition to control points within the dock gates has a historical background dating back to 1911 and 1912. Apart from the historical aspect the men also have objection to entering a control point situated within the dock premises as, immediately they do so, they come under the discipline of the Port of London Authority Police and are not allowed to smoke as they would be able to do in an ordinary highway.

The men felt that the Corporation should have been aware of their various objections and, therefore, they interpreted the shifting of the Royal Docks Control Point as an attempt to force them inside the dock gates against their will. The fact that a similar arrangement at the Surrey Dock is accepted by the men makes it a little difficult to appreciate fully the objection which has been raised at the Royal Docks. It would appear, however, that the men entertain some suspicion that the rearrangement was designed to bring them under stricter control. We consider that this suspicion on the part of the men is unjustified and militates against measures which are designed to improve their conditions.

We understand that the industry is in agreement that it is an indispensable condition of the Scheme that the control points should provide adequate facilities for arranging a fair distribution of work, for exercising effective control, and for the taking of proof of attendance. We consider that the provision of control points and covered calling-on stands must remain as an ultimate object of the Scheme but that any change should be made with the concurrance of the Local Joint Committee. As such provision is in accordance with the policy of the unions concerned we feel they should accept the responsibility of educating the men with a view to removing any unfounded suspicion which they may nurture as to the ultimate objects of the Corporation in making new arrangements in this direction and to getting the men to accept them.

In dealing with the allegations concerning the discipline imposed by the Corporation's officers in London, some comment on the Corporation's position seems necessary. The function of the Corporation is to apply the Essential Work (Dock Labour) Order to selected ports by establishing and administering Dock Labour Schemes for this purpose.

The London Dock Labour Scheme came into operation in March, 1942, during a period of great depression in the docks and was welcomed both by the men and the employers. In the early days of the scheme large sums by way of payments for attendance money during the period of under-employment, and one of the main functions of the Corporation's officers was to transfer men by direction to other ports, which was the cause of most of the trouble arising at that stage. When, however, busier times arrived and the men were called upon to work six-and-a-half or seven days a week the position arose that men, who in many cases considered they were in need of a rest, had necessarily to be directed by the Corporation's officers to work which often was of an uncongenial character.

The fact that the men were not in practice called upon to comply with the full provisions of the scheme immediately on its inception has, we think, given rise to much misunderstanding as to the functions of the Corporation's officers. Instead of its being appreciated that these officers are administering a statutory scheme there is often the feeling among men against whom disciplinary action has been taken that the Corporation's officers are acting arbitrarily, harshly and unsympathetically.

Political Agitation

Over and above these considerations there is the influence of a small subversive political section, most of whose supporters are new to the industry, who have tried to spread trouble by exploiting the real or alleged grievances of the men instead of encouraging them to proceed through the normal trade union channels.

There appears to be a good deal of misapprehension regarding both the status and scope of the Corporation. On the one hand the Corporation is charged by the Minister of Labour and National Service with administrative responsibilities under the Essential Work Order, this necessitates a close liaison with the Government Departments which gives rise to misunderstanding as to the Corporation's independence. On the other hand as (with the exception of the chairman, vice-chairman and the financial director) the directors of the Corporation are nominated by the employers or workers' organisations in the dock industry, the Corporation is sometimes looked upon as part of the ordinary machinery of the industry. We must, however, say bluntly that it is clear from the evidence submitted to us that in London the Corporation is not really regarded—and perhaps even may not regard itself—as an integral part of the industry, but as something apart. There is, therefore, a tendency to blame the Corporation without fully appreciating that it is the duty of the industry to give it all the support it can. There is a corresponding tendency for the Corporation to overlook the need for taking every opportunity to carry the industry with it, even where consultation may not be a statutory or formal obligation, and to make sure that it can at no stage be said to be iguoring the industrial machinery or local or practical experience. On the whole, we are satisfied that the Corporation's officers in the Port of London perform their duties with patience, consideration and good humour.

Prior to the introduction of the Dock Labour Schemes a predominant feature of the dock industry was its large casual labour

The London Dockers' Strike—continued

force. The schemes, in contrast provide for decasualisation during war-time by the establishment of a regular pool of labour and the payment of attendance money to men who attend for, but are not allocated to, work. All witnesses were agreed that so long as decasualisation of the industry is in operation it is essential that it should be administered by the National Dock Labour Corporation or some other organisation.

It is, however, our unanimous view that the experience of working the scheme for the past three years in London shows that there is need to review some of the disciplinary and other related arrangements so as to make for smoother and more efficient running.

Indiscipline

Statistics relating to the various categories of indiscipline with which the Corporation's officers have been called upon to deal in exercise of their responsibilities under the London Dock Labour scheme show that—

(a) absenteeism was one of the more frequent offences, and
(b) a majority of the cases of alleged indiscipline occurred while the men were in employment.

One of the objects of the dock labour scheme being decasualisation, the dock labour force is of necessity maintained at the minimum required for securing the quick turn-round of ships; absenteeism must, therefore, always be a matter of concern, particularly as the absence of one or two men from a gang can, and does, cause serious delay. Accordingly, when in January, 1945, absenteeism in the Royal Dock rose to 13.5 per cent. the position was sufficiently grave to warrant the special attention of the corporation's officers.

Absenteeism

There is, we feel, a good deal of misunderstanding in the public mind as to absenteeism. The figures for " absenteeism " embrace not only those who wilfully absent themselves from work, but also any who may be absent through sickness or other legitimate cause. Owing to the heavy nature of dock work, and the conditions under which it is performed, the dock industry inevitably has a very high incidence of sickness and accident. When, in addition, regard is had to the fact that only very recently many men in the port have been working a seven-day week, often under enemy attack, and live in areas which have received more than an average share of the bombing, it speaks well for the men that the general rate of absenteeism has not been higher.

Some of the complaints under this particular head come from men who allege that it is difficult for them to obtain a day or two's rest after the completion of a job involving heavy work or long hours. Many of the complaints which came before us were not sustained. There were, however, cases of undoubted hardship, and it has to be considered whether the existing machinery, even if fully used, is adequate, or needs improving. If, for example, permission is sought after the time off has been taken it is manifestly difficult for the Corporation's officers to excuse absence from work other than for illness or grave domestic trouble. So far as the Committee's investigations have shown, we have no reason to believe that sympathetic consideration is not given in cases where men have done long and heavy work, or that leave of absence has not been granted when a reasonable cause has been given, provided application has been made to the appropriate officer of the Corporation before the leave has actually been taken.

We feel, however, that the onus for applying for leave to be absent should not fall entirely on the men themselves. It should not be impossible for both sides of the industry to establish satisfactory arrangements whereby the men are entitled to leave of absence " on completion of a job involving heavy work or long hours " subject to the labour requirements of the port. We recommend that early joint consideration should be given to this matter.

We have been impressed by the complaints of the men against—

(1) the automatic break of the guarantee without the right of appeal for offences committed while in the Reserve Pool, and
(2) the Corporation's disciplinary action in alleged cases of indiscipline while in employment.

Clause 18 (a) of the Port of London Dock Labour Scheme provides that any transport worker who without good cause fails to attend a call, or to report at the Control Point, or fails to accept any suitable employment to which the Port Manager directs him, or refuses transfer to another port if required to do so, is not entitled to any attendance money during that pay week.

The effect of this provision is that where men, while working on the same job, commit the same offence in the same circumstances, the degree of the penalty differs according to the number of attendances each man has proved during the week. If, for example, one man had proved one attendance, his penalty would be only 6s., but if, as might well be the case, another man involved in the same incident had proved ten attendances, the penalty would be £3. While there is some justification for a greater penalty for default by a man who has done little or no work during the week than by one who has been fully, or almost fully, employed, there remains a sense of grievance due to this apparent inequality of treatment. The more real grievance arises from the absence of appeal from what is virtually an automatic forfeiture, notwithstanding that from the terms of the Clause itself there may be doubt as to fhether the default was " without adequate cause."

The men's strongest criticisms against Clause 18 (a) of the London Dock Scheme are that—

(1) no right of appeal is provided against what is practically an automatic break in the guarantee, and
(2) the break in the guarantee is avoided only if adequate cause for the alleged breach can be shown which puts the men in the position of being regarded as *prima facie* guilty so that they have to prove their innocence.

These difficulties do not arise through any shortcomings on the part of the Corporation's officers, but are inherent in the provisions of Clause 18 (a). As this Clause is common to all the dock labour schemes operating under the Essential Work (Dock Labour) Order, any proposal to amend it would require consideration at national level. In our view the question of determining whether there had been adequate cause should not be left entirely for the decision of the Port Manager, but there should be provision for an appeal, whether or not the manager has imposed any further penalty under Clause 18 (c), in connection with an alleged offence.

We are of the opinion that something could, and should, be done within the present framework of the London Dock Labour Scheme to meet some of the mens' criticism. Accordingly we recommend that in the case of alleged disciplinary offences committed by men while in the Reserve Pool, instructions should be issued to the Port Manager that before deciding whether or not there has been adequate cause for the alleged breach, there should be consultation. In many cases this could be achieved by discussion with the man and his Union representative; in cases of difficulty the consultation should be with a special advisory committee to be set up in each sector, composed of representatives of both sides of the industry, including " laymen."

Case of the Unions

In the case presented by the unions it was stated that they had consistently challenged the right of the Corporation's Port Manager to take disciplinary action against the men for alleged offences arising while in employment. They consider that the competent body to deal with such offences which arise out of industrial agreements is the committee responsible for the industrial agreement. Whatever are the merits of this view, it must be pointed out that the disciplinary powers exercised by the Corporation's Port Manager in these cases have been definitely imposed upon him by the Dock Labour Scheme.

The removal of these cases from the Port Manager's responsibility would require an amendment to the London Dock Labour Scheme, which would have to be considered nationally as the provision concerned is common to Corporation's scheme for other ports.

The London Dockers' Strike—continued

Discipline should be swift and certain and just in its incidence, but it is also important that it should clearly appear to be just. This brings us to another criticism under this heading, viz., that the Port Manager's decision in this type of case is often based largely on the employer's report of the incident, and that such cases only receive full consideration if and when they come before the Appeals Tribunal. The men consider that there should be some arrangement for ensuring that cases are given due consideration before the manager reaches a decision.

We were impressed by the fact that the consideration of disciplinary action for alleged offences occurring while in employment must in many cases give rise to questions of interpretation of industrial agreements. We are in sympathy with the view expressed on behalf of the men and recommend that the Port Manager should be required to consult the appropriate industrial committee before reaching a decision to impose a penalty against a man alleged guilty of such an offence. In accordance with the terms of the scheme the eventual decision would be that of the Port Manager, but we feel that if he were obliged to consult an industrial committee in such cases it would not be an undue restriction of his powers. This, we think could be done within the present framework of the London Dock Labour Scheme by a direction issued to the Port Manager by the local board of the Corporation, and would go far to remove any suggestion that the Port Manager is deciding what is or what is not a breach of the working rules of the port.

In the case of the ocean shipowners group the appropriate committees would be the dock area committees. In other groups of employment, where no such committees exist, they should, in our view, be appointed so as to be available for consultation by the Corporation manager in the manner we have suggested.

In making the recommendations in the above paragraphs we realise that their adoption might increase the already large number of committes operating in the Port of London. The evidence which has been put before us has caused us some uneasiness as to the effectiveness of the liaison between these various committees, and we suggest that their functions could, with advantage, be examined with a view to eliminating any whose continuance is unnecessary.

It was represented to us that it happens that the members of the appeals tribunals, who are drawn equally from the employers' and workers' sides, have, prior to the hearing of an appeal become aware of some aspects of the case in their private capacity as trade union representatives or employers. It was suggested, and we agree, that in such circumstances a judicial consideration of the appeal is rendered difficult. In order to avoid such a situation we recommend that arrangements should be made for the members of the tribunal to be drawn as far as possible from an area other than that in which the incident forming the subject of the appeal occurred.

Complaints were made to us that the schemes do not provide for the taking of disciplinary action against employers for breach of the terms of the schemes. There is in Clause 18 (a) of the London scheme a power to discipline an employer who fails to carry out the conditions of the scheme, or fails to make payments which he is required to make to the Corporation; no evidence of any such cases was presented to us. It seems, however, that the men's objection arises more from the case where a man is penalised for the breach of an industrial agreement while in employment, whereas the employer, who may also be in breach of such an agreement, escapes without punishment.

We feel it is essential to the smooth running of these schemes that any suggestion that they do not operate in any respect with equal fairness between employers and workers should be remedied or shown to be unfounded. We understand that the question of amending the schemes was considered about two years ago by a liaison committee consisting of representatives of the National Joint Council for Dock Labour and the Corporation. We recommend that these discussions should be resumed. We feel that the object to be aimed at should be the bringing of an employer alleged to be in breach of an industrial agreement before the appropriate Joint Committee, which would advise the Corporation as to the facts. If a default were proved there should be power, subject possibly to an appeal to the Minister of Labour and National Service, to suspend the employer and to exclude his foreman from engaging men at the call stand. This is, of course, a matter which requires to be dealt with nationally.

During the course of the enquiry it was suggested by more than one witness that some of the difficulties in the port arise through the Corporation's organisation in London being too centralised. It was represented that London is in fact a series of ports, but that the area managers have only limited responsibility over their areas. From the evidence put before us we consider that there is some ground for this view, and that a measure of decentralisation is required in order to facilitate the administration of the port. It is recommended that the area manager of each separate area should be invested with greater authority, particularly in the exercise of disciplinary powers, subject to the approval of the port manager as to the terms of any penalty ultimately imposed, which is essential so as to ensure uniformity of action throughout the port.

Criticism was made to us of the manner in which the Corporation's London officers allocate labour. Men complained of having been sent to jobs for which they were unsuited, while employers stated that some of the men allocated to them were not of the upper grade. The basis of some of the criticism is, we believe, to be found in the application of the continuity rule to the discharging and loading of ships which requires men to continue at work at the job to which they have been allocated until it is completed. In contrast, many of the men in the past—in pre-war years—" followed " particular employers and often preferred to stand-off when that employer had no work to offer and to wait until another ship or cargo arrived for him, when they would re-enter his employ.

In present circumstances, there is a temptation for men who have received an allocation which they dislike to leave that employment before the job has been completed in the hope that they will manage to get allocated to work more to their liking. This is not only in breach of an industrial agreement, but causes confusion and delay through the necessity of having to make up gangs that have been depleted. Furthermore, if the attempts made by some of the ment to restrict themselves to certain employers were allowed to continue without restraint, the mobility of the labour force would be reduced and the value of the dock labour scheme impaired.

On the other hand, in accordance with Clause 10 (b) of the Scheme, an employer is entitled to expect that the men allocated to him are accustomed to the work on offer. It emerged during the hearing that one of the causes of the allocation of unsuitable labour is that at the time of making labour requisitions some employers do not know precisely what commodities might have to be handled. While appreciating such difficulties, we feel that given goodwill on both sides, and providing that the employer " gives the fullest available information of his requirements to the manager, they should be capable of adjustment. Accordingly we recommend that this matter should be pursued between the Corporation's officers, the employers and the unions so as to eliminate to the greatest possible extent the allocation of unsuitable labour by the Area Manager.

Negotiation Delays

In the presentation of evidence several references were made to difficulties and delays which have arisen in negotiations, because the representatives of the National Amalgamated Stecedores the Dockers appear to have no power of entering into binding agreements and have to go back to seek authority from their executive, with the result that all agreements reached are conditional only. We appreciate that there are cases involving matters of high policy in which the various parties, both employers and unions, require to consult the organisationss on whose behalf they are appointed. We feel strongly that when the officers of employers' organisations or unions are acting in a representative capacity they should be given reasonable powers to make decisions which will be accepted as binding on their members without constant recourse to the bodies by which they are nominated. We recommend that the executive committee of the

The London Dockers' Strike—continued

National Amalgamated Stevedores and Dockers should consider whether their organisation in this respect could be brought more into accord with normal industrial practice.

Conclusions and Recommendations

The following are the conclusions come to and the recommendations made in the Report:—

(1) The Committee of Enquiry unanimously consider that the strike was wholly unwarranted, particularly as there is established machinery capable of dealing with any matter in dispute.

(2) The provision of control points and covered calling-on stands must remain as an ultimate object of the scheme.

(3) There is need for closer liaison between the industry and the Corporation.

(4) The Corporation's officers in the Port of London, on the whole, perform their duties with patience, consideration and good humour.

(5) The experience of working the London Dock Labour Scheme for the past three years shows that there is need to review some of the disciplinary and other related arrangements.

(6) Early joint consideration should be given to the question of establishing satisfactory arrangements for entitling the men to leave of absence, subject to the labour requirements of the port, on completion of a job involving heavy work or long hours, instead of the onus for applying for leave falling entirely on the men themselves as at present.

(7) As regards disciplinary offences alleged to have been committed by men while in the reserve pool, the Port Manager should be under instruction that before deciding whether or not there was adequate cause for the alleged breach, there should be consultation, normally with the man and his trade union representative, but in cases of difficulty with a special advisory committee to be set up in each sector, composed of representatives of the industry, including "lay-men."

(8) As regards disciplinary offences alleged to have been committed by men while in employment, which often involve questions of interpretation of industrial agreements, the Port Manager should be required to consult the appropriate industrial committee before reaching a decision to impose a penalty.

(9) The functions of the various committees operating in the Port of London could, with advantage, be examined with a view to eliminating any whose continuance is unnecessary.

(10) Members of Appeals Tribunals should as far as possible be drawn from an area other than that in which the incident forming the subject of the appeal occurred.

(11) There should be a renewal of the discussions, initiated about two years ago, between the National Joint Council for Dock Labour, and the Corporation, regarding the provisions of the Dock Labour Schemes relating to the disciplining of employers.

(12) The Corporation's organisation in London should be decentralised to a greater extent than at present with a view to giving Area Managers greater authority, particularly in the exercise of disciplinary powers.

(13) Joint consideration by the Corporation's officers, the employers and the Unions in London should be given to the question of improving the present arrangements for the allocation of labour.

(14) The executive committee of the National Amalgamated Stevedores and Dockers should consider whether their organisation could be brought more into accord with normal industrial practice as regards giving their representatives reasonable powers to reach agreements.

The Report in an appendix sets out a summary of the suggestions made by various organisations in the course of giving evidence.

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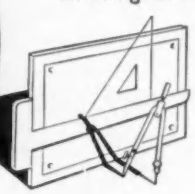

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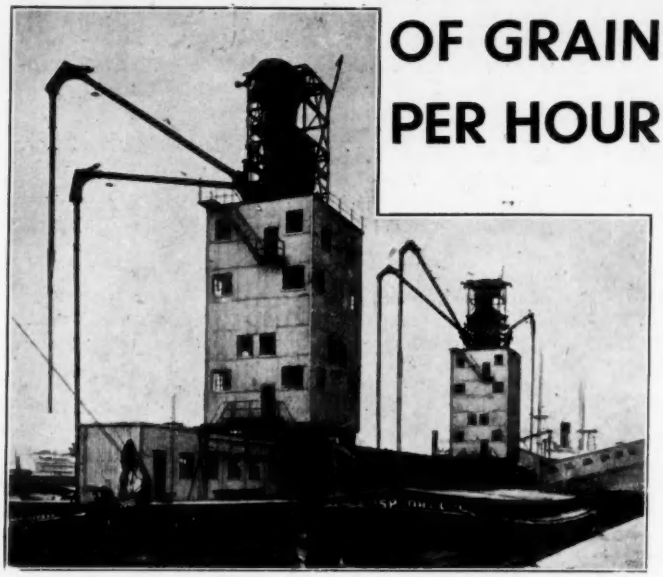

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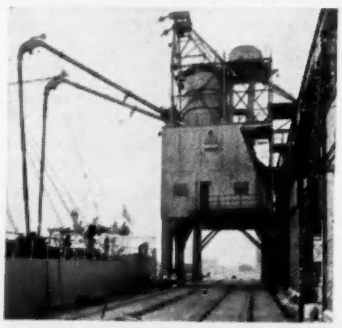

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